Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine, and The Telephone

PU BLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY, MONADNOCK BLOCK, CHICAGO

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1880 Paris Exposition Medal for Rubber Insulation 1893 World's Fair Medal for Rubber Insulation

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

THE STANDARD FOR RUBBER INSULATION

OKONITE WIRES, OKONITE TAPE, MANSON TAPE, CANDEE PAT'D POTHEADS

THE OKONITE CO., Ltd. Sole Manufacturers 253 Broadway, New York

WILLARD L. CANDEE, H. DURANT CHEEVER, MANAGERS. W. H. HODGINS, SECRETARY. GEO. S. MANSON, SUPERINTENDENT. W. C. CANDEE, ASST. SECRETARY

OKONITE TRADE MARK REG. U.S. PAT. OFFICE

CONDUIT

P C C

CLAY PRODUCT COMPANY

Stock Exchange Bldg. CHICAGO

CHAS. G. STEVENS CO.

BRIGHT COLD ROLLED AND COLD DRAWN

NORWAY IRON, MAGNET STEEL

Cold Drawn Steel—Rounds, Flats, Square, Hexagons.

COLD ROLLED STRIP STEEL

LARGE STOCK ALWAYS ON HAND.

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McROY CONDUITS

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Insulated Wires and Cables

1850 DAYS KERITE 1908

The Insulation which has withstood successfully the test of half a century

W. R. BRIXEY, Sole Manufacturer

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30 Church Street, NEW YORK

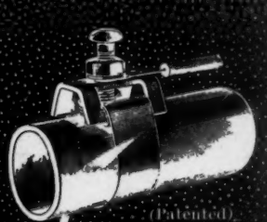
CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONE SUPPLY CO.

FACTORY AND GENERAL OFFICES

ELKHART, IND. U.S.A.

NEW YORK GROUND CLAMP



(Patented)

for connecting telephone ground wires to pipes or cables without the use of solder.

Adapted to any size of iron or lead pipe.

Makes a firm and permanent electrical connection.

Used by Independent Telephone Companies everywhere.

Approved by National Board of Underwriters.

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Yonkers, N. Y.

"DETROIT" RUBBER COVERED WIRES

Telephone Pair a Specialty

DETROIT INSULATED WIRE CO.

Detroit, Mich.

PLATINUM

Wire, Sheet, Rivets and Contacts

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N. Y. Office: 30 Church Street

TELEPHONE CABLE

WATERBURY CO., 69 SOUTH STREET, NEW YORK CITY

ALPHABETICAL INDEX TO ADVERTISEMENTS ON PAGE 38

Platinum Rivets

All forms of Platinum Contacts for telephone construction

CATALOGUE FURNISHED ON REQUEST

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New York Office: Cortlandt Bldg., 30 Church St. Newark, N. J.

The Indiana Rubber & Insulated Wire Co.

MANUFACTURERS OF

PARANITE TRADE MARK

Insulated Wires and Cables

JONESBORO, IND.

Peirce Specialty Company

ELKHART, INDIANA

Engineers, Designers and Manufacturers

Peirce Specialties

All Steel Pole Brackets, All Steel House Brackets, All Steel Transposition Brackets, Pole Seats (5 Designs), Cross Arm Back Braces (Channel Steel), Distributing Circles (3 Design), Fastenings for twisted pairs, Expansion Bolts, Hammer Drills for Drilling Masonry, Test Connectors and Cable Hangers.

Prompt Printing For Telephone Companies

Our well equipped plant, thorough organization and ripe experience in this class of work, enable us to render superior service at exceptional prices.

WRITE FOR OUR TELEPHONE CATALOGUE, SAMPLES AND QUOTATIONS :: :: ::

SHIELD STICKERS A SPECIALTY.

MIRROR PRINTING CO.

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Standard Underground Cable Co.

Pittburg Boston St. Louis New York Philadelphia Chicago San Francisco Atlanta, Ga. Los Angeles, Cal.

Bare and Weatherproof Copper Wire and Cable

Rubber Insulated Wire and Lead Covered Cable

We Furnish, Install and Guarantee Everything Connected with

Telephone Wire and Cable Accessories

Monnot Copper-Clad Steel Wire

LONG SPANS

You Can Safely Use a Long Span with Copper-Clad

Fewer Poles, Fewer Insulators } Lower First Cost — Lower Maintenance Cost { NoSagging, Reduced Breaking

Manufactured by

DUPLEX METALS CO. - 208 Fifth Ave., New York

CIRCULAR LOOM

IN YOUR STORAGE BATTERY ROOM

AMERICAN CIRCULAR LOOM CO.
TRADE MARK REGISTERED

Use Circular Loom for protecting and insulating your battery leads. Place Circular Loom around metal pipes running above the cells to protect them from fumes and to keep metal particles from falling off into the battery. It's neater and better than the ordinary boxing.

You'll find new Circular Loom uses for every day.

Order from your dealer or address

AMERICAN CIRCULAR LOOM CO.

BOSTON, MASS.

NEW YORK CHICAGO SAN FRANCISCO

Established 1820

Switchboard Cords
Receiver Cords
Desk Cords

ALFRED F. MOORE INSULATED ELECTRIC WIRES AND CABLES ESTABLISHED 1820 PHILADELPHIA

Cables
Weatherproof Wire
Rubber Covered Wire

ALFRED F. MOORE
200-218 N. 3rd Street PHILADELPHIA

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TELEPHONE WIRE

WIRE ROPE
WIRE STRAND

JOHN A. ROEBLING'S SONS CO.

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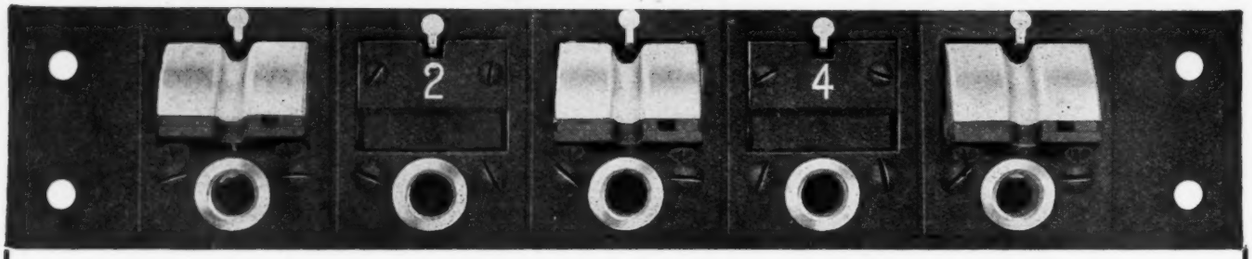
No. 45 Cable Wax

This material is permanently plastic and will resist the extremes of heat and cold met under working conditions.

For conduit junction boxes and underground electrical work it is superior to ordinary compounds of this character.

¶ Let us quote you on your requirements and send a sample.

Massachusetts Chemical Co.
Sole Factories: WALPOLE RUBBER WORKS, WALPOLE VARNISH WORKS, ELECTRIC INSULATION LABORATORY
Walpole, Mass.



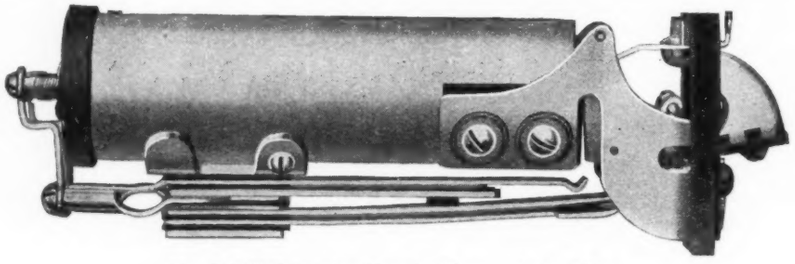
NO. 8 SELF-RESTORING GRAVITY DROP
FOR
150-LINE MAGNETO SWITCHBOARD

¶ The **"drops"** and **"signals"** designed for use on telephone switchboards have in the past usually involved to a great degree, lack of sensitiveness and reliability, which has rendered them either undesirable or impossible of use under many conditions for which, in order to secure sensitiveness of operation, more delicate apparatus and at the same time apparatus very easily thrown out of adjustment has necessarily been made use of.

¶ Our **No. 8 Self-Restoring Gravity Drop** is both sensitive and reliable in operation and not easily thrown out of adjustment. Besides each drop can be removed from the switchboard without change of adjustment.

¶ The shutter and indicator are automatically restored when plug is inserted in jack, such operation exerting a uniform resistance to the insertion of the plug during the whole restoring interval.

STROMBERG CARLSON Registered Trade Mark
Quality Apparatus



STROMBERG CARLSON Registered Trade Mark
Quality Woodwork

No. 8 Self-Restoring Gravity Drop—Actual Size.

¶ The indicator is plainly visible from different directions and constructed to display a plurality of differently exposed **white** surfaces, so that one or more surfaces shall always be prominently in view, regardless of the position of the operator. A combination visual and audible latch indicator and a positive strong night-bell contact is also provided.

¶ Outer surface of indicator is flush with the face of mounting strip when in normal or set position, securing a neater and less cumbersome mechanical construction than heretofore obtained.

¶ All tool-made parts are secured in proper relation to each other independently of mounting plate—no re-adjustment of interchangeable parts necessary before or after mounting drops on mounting strip.

¶ The complete drop coil and core are instantly removable without disconnecting any terminal wires or removing individual drop.

¶ **No. 8 Drops** mounted in units of five (5) on Bower Barff finished mounting strips in our 150-Line Capacity A-5360 Golden Oak Magneto Switchboard Cabinet provides an economical and efficient equipment.

¶ Consider **Quality Apparatus** in this form with all other Magneto Switchboards—then write us for prices—High Quality—Regular Prices.

STROMBERG-CARLSON TEL. MFG. CO.
ROCHESTER, N.Y.-CHICAGO, ILL.

K-E-R-I-T-E

1860 TELEPHONE 1908

Highest Award World's Fair, 1893

Highest Award World's Fair, 1893

Insulated Wires and Cables

¶ The rigid test and continuous service of over 40 years has demonstrated that KERITE does not deteriorate but improves with age, and is Unequalled for Life, Service and Durability

FOR ALL PURPOSES

Interior, Bridling, Distributing, Etc.
Aerial, Underground, Submarine

¶ Rubber covered telephone wire output 2,500,000 feet per week.

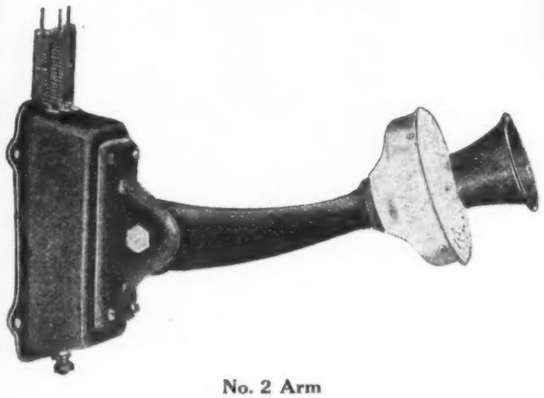
Use KERITE for Service and for Economy

W. R. BRIXEY :: New York City

Sole Manufacturer :: Hudson Terminal, No. 30 Church St.

No. 1 Arm

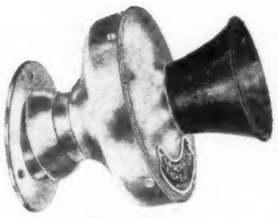
LOCAL BATTERY TRANS. NO. 1L.
COMMON BATTERY TRANS. NO. 1C



No. 2 Arm

Are These Transmitters Headed Your Way?

We Want Your Transmitter Business
They Make Satisfied Customers



No. 3 Arm

Cracraft, Leich Transmitters are alive and ready to transmit the first as well as the last syllable the instant the receiver is removed from the hook.

WRITE AT ONCE
For Information and Prices

Cracraft, Leich Electric Co.
GENOA, ILL.

Have You Met This "Jolly Good Fellow?"

Open View No. 50

If so, you have pleasant thoughts; if not, we will be pleased to give you an entre to the elite. The most popular Magneto Telephone yet produced.

The Standard Telephone Mfg. Co.
PORTSMOUTH, OHIO

Successors to:—The Williams Telephone & Supply Co., Cleveland, O. The Knox-Dickey Telephone Mfg. Co., Portsmouth, O. The Drake Telephone Co., McConnelsville, O.

Do you possess our new Catalog?

M. DONNELLY, PRESIDENT. J. M. RIEGER, SECY AND TREAS. F. P. DIEMER, GEN'L MANAGER.

THE NAPOLEON
HOME TELEPHONE CO.

Napoleon, Ohio, Aug 15th 1908

Long Distance Tele. Mfg Co.
South Bend Ind.

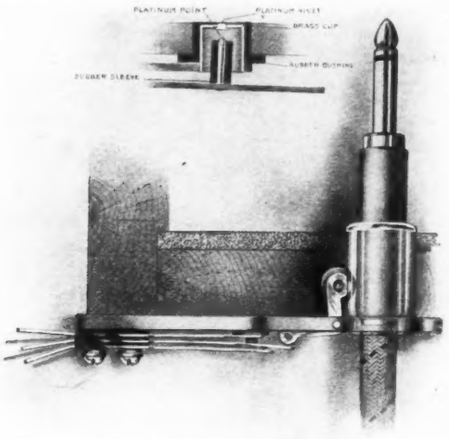
Gentlemen:

In reply to yours of the 1st inst, will say that we are more than pleased with your telephones, We have several Country lines equipped with L.D. telephones and to date we have not made a single trip, or had a complaint from those lines. The only trouble I have is that my old customers are kicking for the duplex telephone.

Yours Very Truly
F. P. Diemer Mgr.

A Dust Proof Contact

The Monarch plug seat switch is equipped with a protected contact which excludes dust and, by insuring clean contact points, makes this part extremely efficient and reliable.



The master spring is operated by a right angle lever fitted at the bearing points with hard rubber rollers, which prevent it from sticking.

It is this careful attention to details and care in mechanical construction in both common battery and magneto equipment that has built up for Monarch apparatus a reputation for reliability.

Let us send you a catalogue.

Monarch Telephone Manufacturing Co.

Factory and General Office:
Washington and Morgan Streets, Chicago, Ill.

Branch House:
177 Main Street, Dallas, Texas

"ROBERTS" AND WHAT IT MEANS

WHY

Limit Your Party Lines To Four Or Eight Parties on a Line?

WHY NOT

Put Twenty Or Forty Parties On A Line?

PARTY FORTY

Selective Ringing System
Secret Service

PARTY FORTY

The ONLY LIMIT To The ROBERTS SYSTEM Is The TRAFFIC LIMIT

If YOU Want To Know MORE About The BEST Party Line SYSTEM On The Market

WRITE TO

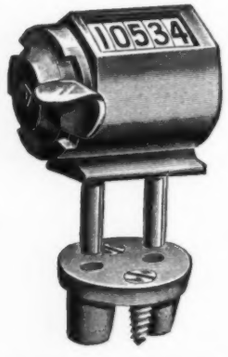
HOMER ROBERTS TELEPHONE CO., 1703 Melrose St., Chicago

HOMER ROBERTS TELEPHONE CO.
1700 Melrose St. Chicago

Changes in Equipment

or terminal arrangement of lines may enable you to give better service or reduce expense. Properly taken peg counts will indicate what changes are desirable. The

VEEDER COUNTER



makes it possible to make such counts without interfering with or hampering the service. There's a special type for telephone work. Our pamphlet explains its many uses. Write for a copy.

VEEDER MFG. CO.

11 Sargeant Street, Hartford, Conn.

Manufacturers of Cyclometers, Odometers, Tachometers, Tachodometers Counters and Fine Castings

Represented in Great Britain by Messrs. Markt & Co., Ltd., 6 City Road, Finsbury Square, London, E. C., England

If You Consider
THE POOLE
Lock-Out System

as an addition to party-line service, you are wrong. It is not something added—it is a feature which has always belonged to good service. It unfailingly gives absolute

SECRECY

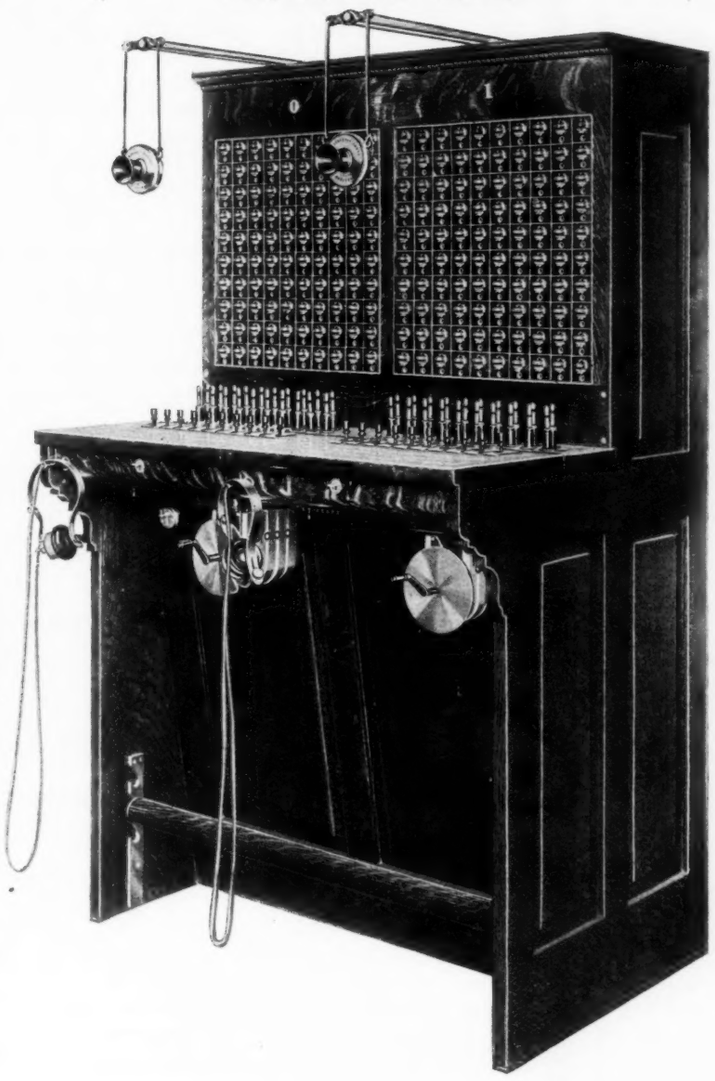
to any of the parties on the line. It gives the subscriber all the advantages of a private line at the cost of a party line. It enables you to put more parties on a line, and get higher rates.

Now, do you want details?

Mountain State Electrical Co.,

Wheeling, W. Va.

200 Line Switchboard with 200 Unit Type Self-contained Drop and Jacks installed

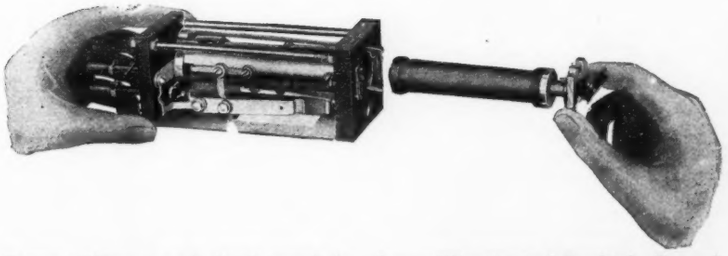


"Switch-Boards"

We can furnish switch-board of any desired capacity. You can have your cabinet wired to its full capacity, install number of drops you actually have use for and add additional ones from time to time as needed, one at a time if desired. You are not required to buy a bank of five or ten if only two or three are needed. Your money invested only in equipment that is earning something for you.

Our central office equipment has features of distinct advantage not found in other makes. A little investigation will prove this to you conclusively. You will favor yourself by investigating our apparatus, getting our specifications and prices before placing your order elsewhere. We solicit your inquiries and invite your critical investigation of our products.

Ask for complete
Specifications, Blue Prints
and
Illustrated Literature
Prices on Application

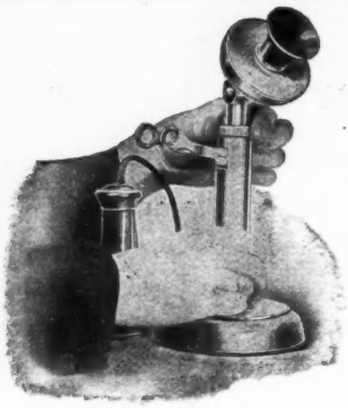


Type of Drop and Jack used in above Illustrated Switch-Board
Note Coil Removing Feature

Swedish-American Telephone Co.

Chicago

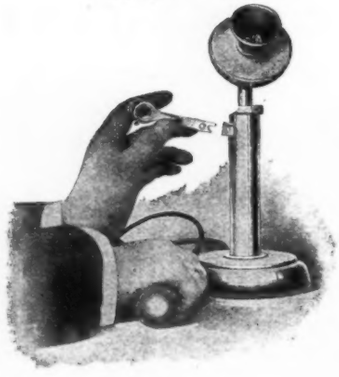
BRANCH, KANSAS CITY, MO.



To inspect the hook switch, loosen the knurled nut at top of stem. You do this with your fingers; there are no mysterious "catches" or patent spring locks to monkey with.

As soon as the nut is loose, the casing may be removed. Now you can see every working part and every wire, and yet every part is operative. There is not a sliding contact in the stand. Every connection is soldered.

By removing **one** screw in the center of the base, the cord terminals are reached. These are of generous size, so you don't need a watchmaker's screwdriver to put in a new cord.



The hook lever is the part that usually "gets it" when the stand is knocked over, so we put this on with a screw. Another lever can be put on in an instant, as shown. No adjustments.

WHY do some stands pull apart into many different pieces? You can't test them when they are apart, and can't see the parts when they are together. What's the use?

Get our Bulletin No. 63

The Sumter Telephone Mfg. Co.

SUMTER, S. C.

NEW No. 2525 H.-C. DESK SET

Most Unique, Durable and Convenient Desk Set Made

By the removal of one screw the set can be taken apart, the outer casing removed the stand reassembled in skeleton form in operative condition with hook switch, induction coil, terminal block and wiring exposed for inspection and this is done without having to disconnect any wires.

Write for Bulletin 205X And Price List

The Holtzer-Cabot Electric Company

Boston (Brookline) Mass. — **395-397 Dearborn St. Chicago, Ill.**

"REBUILT"

TELEPHONE EQUIPMENT

is "REBUILT" not "REPAIRED"

One's like "New," the other's "Old"—always will be

Our "Rebuilt" Equipment Department "Rebuilds" Switchboards—Telephones—Apparatus—Additional Switchboard Equipment—and Handles—Wire—Cable—Cords—Everything Telephonic.

GUARANTEED SAVING 30 TO 50 PER CENT

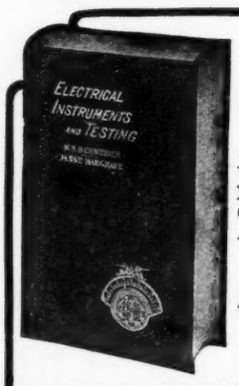
Get Quotations, and if you want our "Rebuilt" Bargain Bulletin sent you regularly—say so—it's **FREE.** *Address*

"REBUILT" EQUIPMENT DEPARTMENT

PREMIER ELECTRIC CO.

VAN BUREN & CLINTON STS. CHICAGO, ILL.

Remember "Rebuilt"—Not Repaired



Send for the Latest Authority on

Electrical Testing

The 3rd Edition contains new chapters on Testing Telegraph Wires and Cables and Locating Faults in Telegraph and Telephone Cables—*By* JESSIE HARGRAVE, *Assistant Electrical Engineer Postal Telegraph Company.*

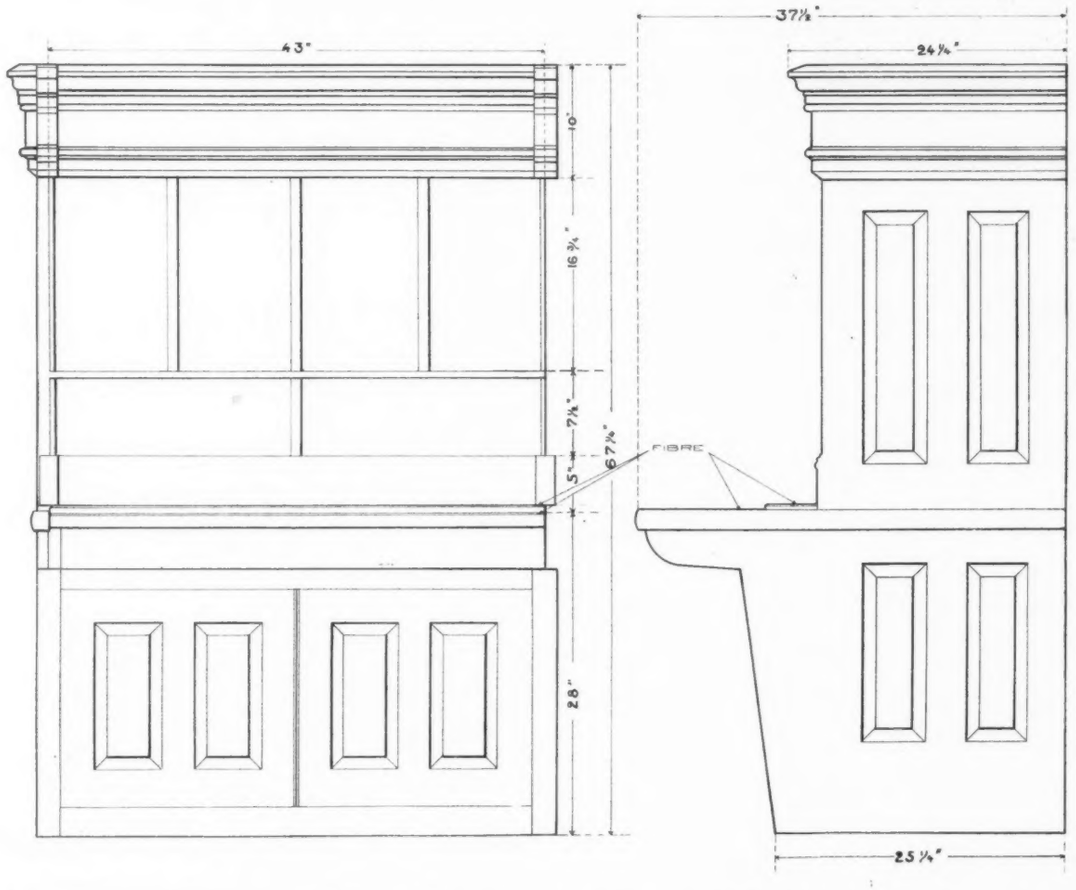
Every Telephone Man can Use this Information.

256 pages, 133 illustrations and diagrams, 12mo., cloth $1.00 full limp leather, $2.00.

SPON & CHAMBERLAIN, 123T LIBERTY STREET NEW YORK CITY, N.Y.

Notice the Dimensions

of an Ericsson 2800 Magneto or Common Battery Multiple Switchboard Section. They are a whole lot smaller than those you are used to see. Compare them with the dimensions of the Switchboard you now have.



Your operator will tell you "what a difference a few feet make" in her reach.

Select wisely next time you're in the market for a Switchboard.

L. M. Ericsson Tel. Mfg. Co.

BUFFALO, N.Y.

WESTON WIRE CHIEF'S VOLTMETER

The Weston Wire Chief's Voltmeter, Model 57, is an instrument specially developed with reference to the requirements of Telephone Companies. With it the Wire Chief is enabled to make rapidly and accurately a large number of the tests of lines necessary to locate the nature of defects and assist him in bringing and keeping the system under his charge up to the highest possible point of efficiency.

WIRE CHIEFS' VOLTMETER—Model 57

An increase in efficiency of 25 per cent has been reported as a result of the use of these instruments in large stations.

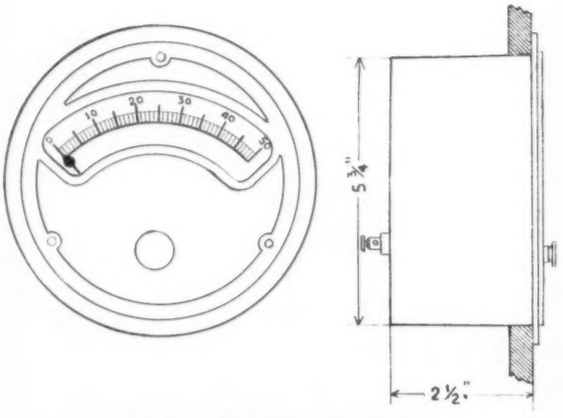
Write for circular, giving full particulars of this instrument, also for any information desired concerning our extensive line of high grade and low priced Switchboard-Portable and Laboratory Instruments for use on either direct or alternating current circuits.

WESTON ELECTRICAL INSTRUMENT CO.

New York Office:
74 Cortlandt Street

NEWARK, N. J.

A Wire Chief's Volt Meter



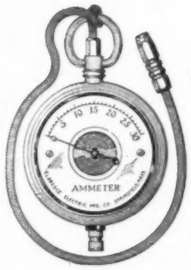
NET PRICE $15.00

This meter fulfills the following specifications: Diameter, 6 inch, flush type, dead black finish. Ranges of scale as follows: 0-50 volts, in ½ volt divisions, having resistance of 5,000 ohms—low reading scale, 0-5 volts, in ⅒ volt divisions, having resistance of 500 ohms. An external shunt is supplied across the high reading scale reducing the resistance to 1,000 ohms, so that when in use the instrument becomes a miliameter, having a range of 0-50 miliampheres.

This instrument is of the well-known high grade dead beat permanent magnet type.

Jewell Electrical Inst. Co.

61 N. Ashland Ave. CHICAGO

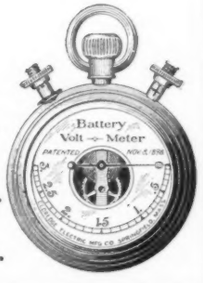


POCKET

Voltmeters, Ammeters, Volt-Ammeters

Miniature Switchboard Instruments

Sold by supply dealers or send direct



ELDREDGE ELECTRIC MFG. CO.
8 P. O. Square
Springfield, Massachusetts, U.S.A.

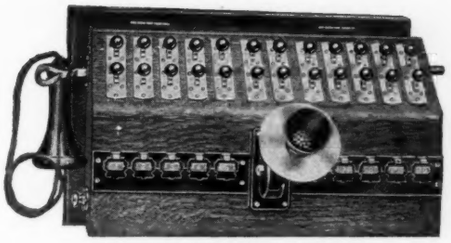
Increased Revenues and Pleased Subscribers

where Connecticut Automatic Intercommunicating Telephones are used. **Non Interfering Trunk Buttons** absolutely disconnect the local system when any instrument is used for exchange calls. Catalog 10-T gives full details. Free upon request.

CONN. TELEPHONE & ELECTRIC CO., Inc.
Meriden, Conn.

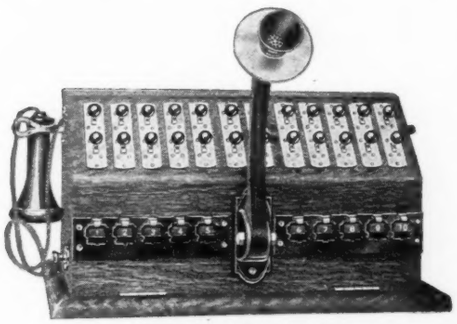
CORDLESS SWITCHBOARDS

For toll lines, rural switchboard station or small exchange, equipped for five or ten lines, either wall or desk type.



TEN-LINE WALL TYPE

A complete magneto telephone and switchboard, including line signals with quick remove coils, night alarm with switch and keys for ringing, listening and connecting.



TEN-LINE DESK TYPE

The elimination of cords with their troubles and the advantage of being able to quickly group together any number of lines, makes this a very desirable piece of apparatus.

Century Telephone Construction Company

BUFFALO :: NEW YORK

QUEEN INSTRUMENTS

"THE RECOGNIZED STANDARD"

Voltmeters
Millivoltmeters
Ammeters
Milliammeters
D. C. & A. C.

Galvanometers

Electrical
Pyrometers

Rail Bond Testers

Acme Decade
Gov't Standard
Midget Decade
Queen-Evershed
Testing Sets

Electrical
Instruments for
All Purposes

THE QUEEN ACME TESTING SET—IMITATED BUT NEVER EQUALLED

QUEEN & CO., Inc., PHILADELPHIA, U. S. A.

Can You Tell Why?

The Andrae Special Heavy Giant Telephone wears longer and requires less attention and repair than other instruments.
It is easily understood by those who have watched telephone construction for the past five years. The price of material has risen and in the scramble for orders the price of telephones has gone down.
There are many cheaper grades of material on the market than those used in the Andrae Giant, but none better or higher priced. The quality and workmanship have never been reduced to meet the price of the finished product.
Material and workmanship mean everything in telephone building and there is only one grade good enough for the Andrae Special Heavy Giant, the best to be had at any price. This means long life, perfect service and practically no repairs.

Send for an Andrae Trouble Proof Giant Telephone on approval.

Julius Andrae & Sons Co. 48 Years in Business at 217 West Water Street Milwaukee

GONGS BELLS

From 1" to 24"

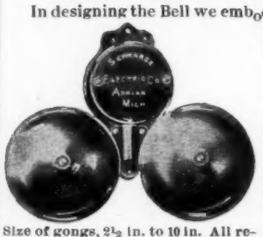
Bell Metal, Steel and Brass
Nickel or Gun Metal Finish

G. C. REITER, Canton, Ohio.

Magneto LOUD RINGING Extension

TELEPHONE BELL

In designing the Bell we embodied a combination of features to produce a bell of the same high efficiency that has characterized our general line of signal bells, to which we invite your inspection.



Size of gongs, 2½ in. to 10 in. All resistances. All weather proof. Efficiency, durability and price will interest you.

Efficiency

The Spools are large enough so that in no case is it necessary to use over No. 35 Magnet Wire, thereby obtaining the maximum number of amphere turns, and this wire is *all active*. The armature is under the influence of the coils its entire length.

Durability

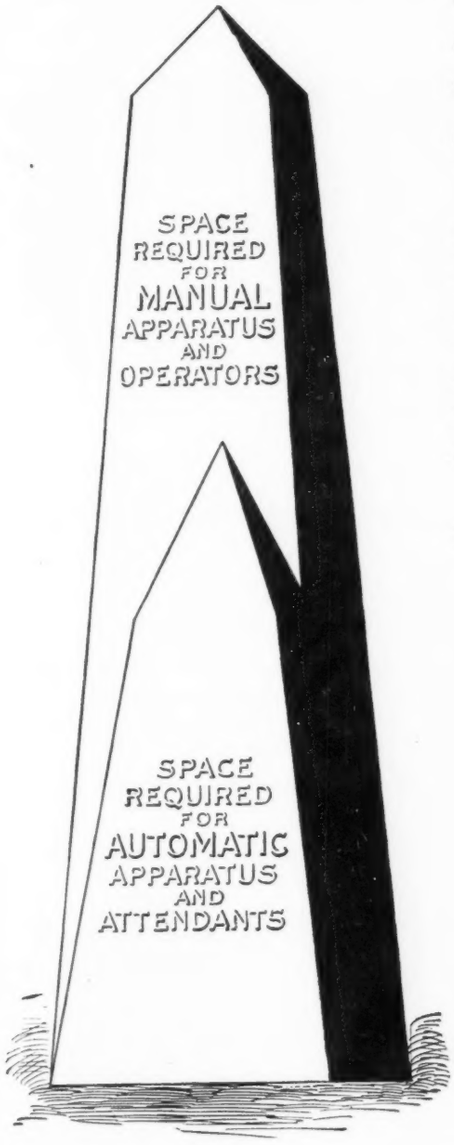
The Poles are arranged in such a manner that the permanent Magnet cannot be discharged, and will not weaken in any service.

SCHWARZE ELECTRIC CO. Main Office and Factory Adrian, Mich.

A MONUMENT PAYS NO DIVIDENDS,—

so why erect a large palatial building for housing manual central office equipment when a smaller, cheaper and simpler one will hold automatic telephone equipment of equal capacity.

With automatic telephone equipment you need no operators, and therefore, no wide stairways, no wide halls, no high ceilings, no rest room, no library, no kitchen, no lunch room, no hospital and no locker room.



Our Automatic System has been adopted in the following cities:

Aberdeen, South Dakota.
Akron, Ohio.
Allentown, Pennsylvania.
Auburn, Maine.
Auburn, New York.
Battle Creek, Michigan.
Beaver Falls, Pennsylvania.
Bellingham, Washington.
Berkeley, California.
Billings, Montana.
Butte, Montana.
Cadillac, Michigan.
Champaign, Illinois.
Chicago, Illinois.
Cleburne, Texas.
Columbus, Georgia.
Columbus, Ohio.
Dayton, Ohio.
Decatur, Illinois.
Dowagiac, Michigan.
Edmonton, Alberta, Canada.
El Paso, Texas.
Emaus, Pennsylvania
Fall River, Massachusetts.
Grand Rapids, Michigan.
Hastings, Nebraska.
Havana, Cuba.
Hazleton, Pennsylvania.
Holland, Michigan.
Hopkinsville, Kentucky.
Houston, Texas.
Jonesboro, Arkansas.
Kenton, Ohio.
Lake Benton, Minnesota.
Lansing, Michigan.
Lewiston, Maine.
Lincoln, Nebraska.
Los Angeles, California.
Manchester, Iowa.
Marianao, Cuba.
Medford, Wisconsin.
Mount Olive, Illinois.
New Bedford, Massachusetts.
Norfolk, Nebraska.
Oakland, California.
Ocean Park, California.
Omaha, Nebraska.
Pontiac, Illinois.
Portland, Maine.
Portland, Oregon.
Princeton, New Jersey.
Richmond, Indiana.
Riverside, California.
Rochester, Pennsylvania.
Rushville, Indiana.
San Diego, California.
San Francisco, California.
Santa Monica, California.
Saskatoon, Sask., Canada.
Sioux City, Iowa.
South Bend, Indiana.
Spokane, Washington.
St. Marys, Ohio.
Strathcona, Alberta, Canada.
Tacoma, Washington.
Toronto Junction, Canada.
Traverse City, Michigan.
Urbana, Illinois.
Van Wert, Ohio.
Wausau, Wisconsin.
Westerly, Rhode Island.
Wilmington, Delaware.

Automatic Electric Company

Van Buren & Morgan Streets

Chicago, U.S.A.

Buy BROOKFIELD Glass Insulators

The Standard

The Brookfield Glass Company
Manufacturers
United States Express Building
Trinity Place, Greenwich & Rector Streets
New York

THE STANDARD "HEMINGRAY"

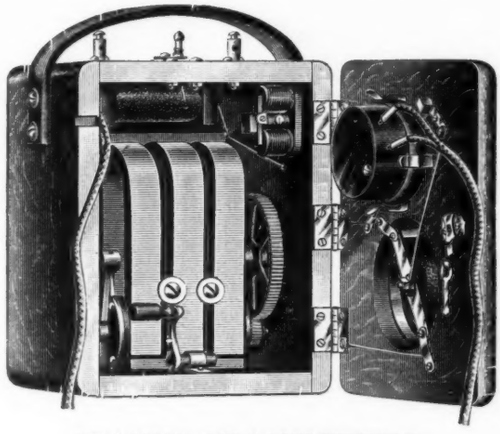
ALL WITH THE "PATENT DRIP PETTICOATS"

THE HEMINGRAY-GLASS COMPANY

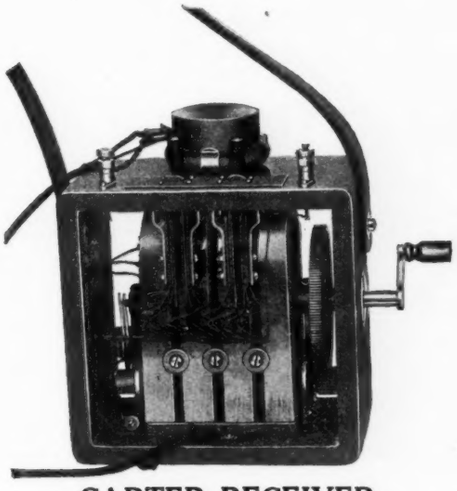
Office, COVINGTON, KY. ESTABLISHED 1848 **Factory, MUNCIE, IND.**

Testing Sets—Portable Sets

Every Telephone exchange should have a reliable testing set. The instruments shown on this page have been on the market for years and have been giving satisfactory service in hundreds of Telephone exchanges.



"EACO" TRANSMITTER
Type Testing Set No. 12400



CARTER RECEIVER
Type Testing Set No. 13533

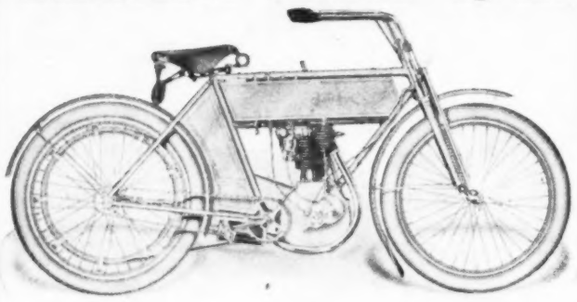
C. & S. SERIES
Portable Set No. 14466. Made also for bridging work

SEND FOR OUR No. 31 BULLETIN ON TELEPHONE PARTS AND ACCESSORIES

ELECTRIC APPLIANCE COMPANY

CHICAGO **DALLAS**
SAN FRANCISCO **NEW ORLEANS**

Excelsior Auto-Cycle



PRICE, $225.00

The Motor-Cycle in the Telephone Service

is a matter of utility pure and simple, a cold-blooded business proposition in which the service rendered is balanced against the cost of maintenance.

The sporting element enters only as a basis of judging the road qualities and dependability of the machine.

Even from this standpoint does not the season's accomplishments of the leading motor-cycles prove their value to you?

Three Excelsior Auto-Cycles

ran from New York to Chicago under more rigid restrictions than would ever obtain in your service and made the run without one moment's delay for replacement, repair, or alteration.

TWO PERFECT SCORES and one 990 points out of a possible 1,000.

Three Excelsior Auto-Cycles

ran in the Chicago Motor-cycle Club Reliability Run in June last and ALL MADE PERFECT SCORES.

Three Excelsior Auto-Cycles

ran in the two day 415 mile reliability test held by the same club on September 14 & 15 in which only eight out of eighteen starters were able to finish and ALL MADE PERFECT SCORES.

So it is everywhere, wherever the road quality of a motor-cycle is tested the

Excelsior Leads

and proves its positive reliability. They will carry your linemen and trouble men faster, farther and more conveniently and economically than any other method of transportation.

Write today for details and the record of service in the leading Telephone Companies.

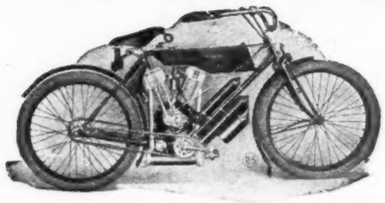
Excelsior Supply Company

233-237 Randolph Street

CHICAGO, ILL.

Established 1876

"R.-S." Motorcycle



THE IDEAL MACHINE

For Telephone Companies, Line Men, Trouble Hunters, Collectors, Etc.

Can be fitted with R.-S. luggage carrier.

Powerful, simple, practical, economical, reliable.

The first and only real Mechanical Intake Valve Motorcycle made and marketed in the United States. Thousands in successful use. The only Motorcycle to climb Pike's Peak. Full of practical features and improvements.

The "R.-S." line comprises Single and Twin Cylinder machines, Tandems, Tricycles, Tri-Cars and Delivery Vans, and represents the most value as well as the most advanced motorcycle construction.

Hundreds of testimonials from every part of United States showing "R.-S." achievements in racing, record making, hill climbing, and endurance tests, sent *free* with complete illustrated catalogue, on request to Dept. A. T.

Reading Standard Company, Reading, Pa.

Makers: The Renowned Reading-Standard Bicycle

HELLO! HELLO!

"Give me the Manager's Office."—"Is this the Manager's Office?"

"Mr. Manager, would you like to save a good pot of money in your construction and repair work?

You can do it by putting your trouble men on **Armac** Motor Cycles.

Wherever tried by telephone companies, they have been very successful and a great many machines are doing good work.

A Chicago city telephone inspector receives $180 a year for car fare which has more than paid for the machine the first year.

This man has ridden an **Armac** two years, 25 miles every day, without a breakdown; so can you.

The **Armac** Motor Cycle is the product of a $100,000 factory that is turning out the best material and workmanship.

EVERY *ARMAC* IS GUARANTEED

It is a durable, strong machine, one that can be depended upon and will stand the racket of rough roads.

A fixture can be attached that will carry tools and wire over rear wheel. **The Motor Cycle is a necessity for telephone service.**

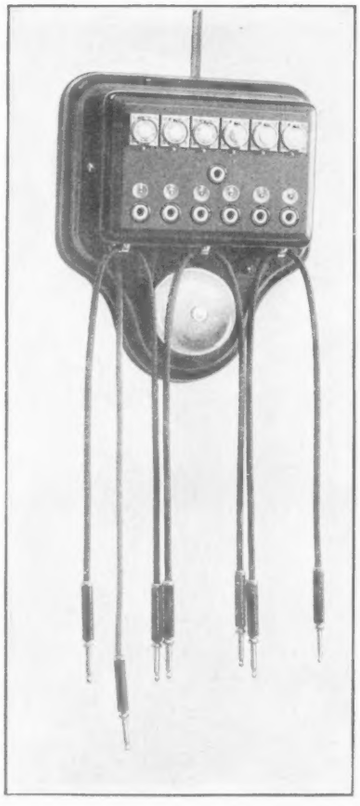
Write to us and we will send you information that will be of great value.

ARMAC MOTOR CO., 472 Carroll Ave., Chicago, Ill.

FURTHER DEVELOPMENT

IN

The Ericsson Steel Line



Ericsson New Type Steel Wall Switch No. 3

The present tendency in all Industries is to substitute ***Steel*** for Wood.

We have now modernized also our Wall Switches by making the boxes of ***Steel.***

They are finely enameled just as our ***Steel*** Telephones.

Drops and Jacks fitted in panel of ***Special Fibre.***

Front box ***hinged*** for convenient inspection.

All Terminals ***concealed*** and placed on backboard.

Night bell and ***reliable*** night contacts.
Machine screw lock.

L. M. ERICSSON TELEPHONE MFG. CO.

BUFFALO, NEW YORK

ERICSSON

STEEL WALL SWITCHES

For Toll Lines, Farmers' Lines
Office and Factory Systems

Equipped with Series or Bridging Drops as required.

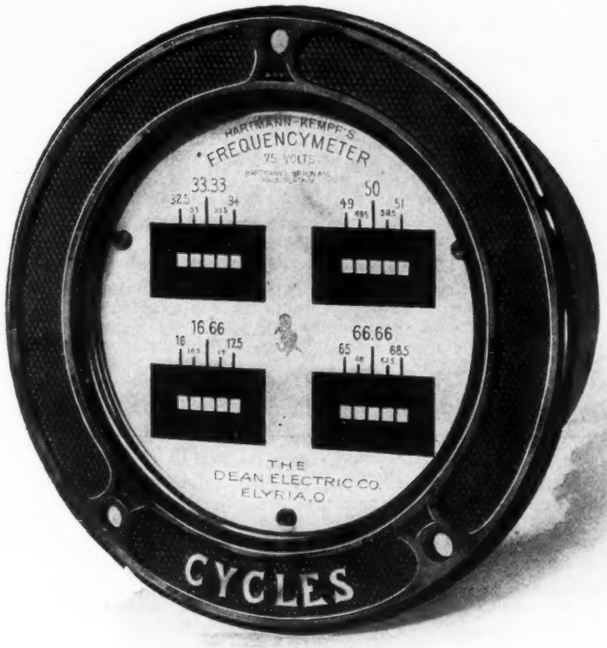
	Lines	Pr. of Cords
No. 1	4	2
No. 2	5	2
No. 3	6	3
No. 4	8	4
No. 5	10	4

These Switches are intended to be used with a Telephone Instrument.

A special Plug and Jack are provided for answering and operating purposes, both being directly connected to the Telephone. :: :: Write for prices

L. M. ERICSSON TELEPHONE MFG. CO.

BUFFALO, NEW YORK



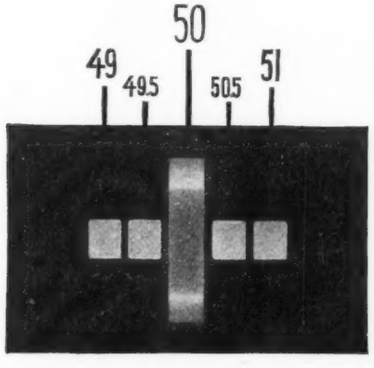
SCIENTIFIC SELECTION

¶ **The "Dean" Harmonic System** is still the only successful party line selective ringing apparatus in the world.

¶ **Absolutely no Failures** is the "Dean" record since the introduction of our Harmonic Converter (registered trade-mark) and our Harmonic telephones.

¶ **No working Installations** can be shown by some of the makers of imitating appliances—hence the long list of "Dean" successes is abundant proof of superiority.

¶ **Even the Slightest** uncertainty is now eliminated —"Dean" selective ringing is an exact science through the use of the



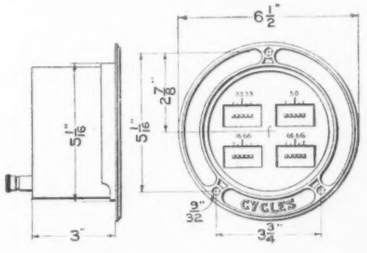
Hartmann-Kempf Frequency Meter.

¶ **With this Instrument** the number of cycles per second may be readily determined—the reading is instantaneous.

¶ **Plain Readings** are indicated by the reeds which vibrate as illustrated. Each of these reeds is a separate unit, even if one should be broken, the efficiency of the others would not be impaired.

¶ **Their Permanency** has been proven by three years' continuous vibration before the invention was marketed.

¶ **Hartmann-Braun, A. G.,** the manufacturers, of Frankfort a /M, Germany, have made us the American sales agents for this special instrument.



¶ **The Exact Dimensions** are shown in this drawing. The meter may be mounted in a portable case, or on a suitable mounting board above your power panel; or, it may be specified for any new "Dean" board.

¶ Send for Dean Folder No. 15.

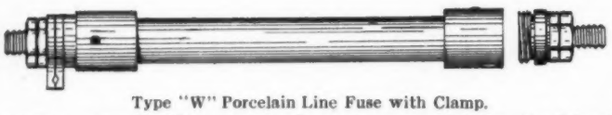
The Dean Electric Company

ELYRIA, OHIO, U. S. A.

San Francisco **Kansas City**

AMERICAN PORCELAIN FUSES

TRIPLE LENGTH OF FUSE WIRE



Type "W" Porcelain Line Fuse with Clamp.

Two new American Porcelain Fuses are here illustrated. They are of a new design and possess distinct merits in comparison with other fuses.

The fuse tube is made of unglazed porcelain, which is made extra tough and strong by a special process. Porcelain, of course, is a perfect insulator, and, being porous, permits the escape of gases generated by the blowing of the fuse.

But the most important and novel advantage of the American Porcelain Fuse lies in the way that the fuse wire is passed through the tube. The tube contains three holes or channels for the wire, instead of the one hole of ordinary fuses. The wire is passed through the tube in one hole, then back again through a second hole and again back through the third hole, the two ends of the fuse wire then being exposed at opposite ends of the tube. This gives three times the length of fuse wire in the same length of tube, and makes the safest fuse on the market to-day. It also makes it possible to mount fuses in a smaller space than can be done with any other fuse. The fuse terminals are made in two pieces, a "ring" and a "head." The ring is permanently fastened to the porcelain tube, but the head is removable. The fuse wire is soldered to the ring, through a hole in the side, and then the heads are screwed into place in the rings. The unscrewing of the heads exposes the fuse wire for inspection or repair.

Cross Section American Porcelain 3 Way Fuse

This new design of American fuse has been made up in two standard styles as shown in the illustrations, one style being for use as a line fuse with clamps (Type W,) and the other style being made plain. for use in cable boxes, etc. (Type V.) The principle of the "three way" fuse is the same in both styles. American Porcelain Fuses are the safest fuses made, because within the same length as ordinary fuses, they afford three times the ordinary fuse wire length. They also are the most easily renewed of any fuses on the market.

Type "V" Porcelain Fuse.

AMERICAN ELECTRIC FUSE CO.

MUSKEGON, MICH. - - - - - NEW YORK, N. Y.

"FUSE"

FOR THIS TERMINAL

will cost you but 1-20 of a cent each. Better protection, less troublesome, easier installed, and much less expensive than other terminals.

Fuses are all tested with the naked eye.

LET US SEND YOU OUR NEW ILLUSTRATED CATALOGUE

The Protective Electrical Supply Co.

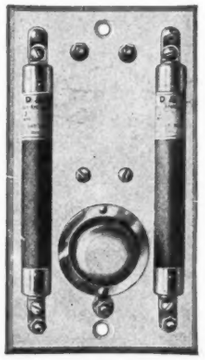
Fort Wayne, Ind.

"D&W"

FUSES PROTECT

AGAINST SHORT CIRCUITS

Are Your LINES Amply Protected



If Not TRY Our New Protector

CATALOG NO. 3105

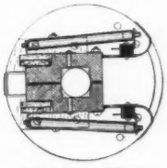
FOR SUBSCRIBER'S PREMISES

D & W FUSE CO.

PROVIDENCE, R. I.

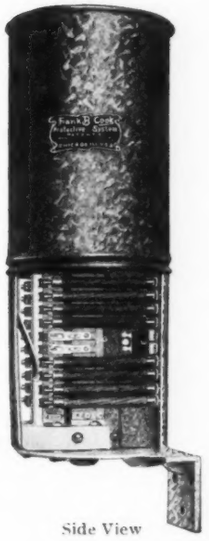
Type S-8

Protected COOK Terminal Porcelain



Sectional View

Small and Compact — Highly Efficient



Side View

Self Contained Pot Head — Fire Proof

The practical use of porcelain as an Electrical Insulation has been thoroughly demonstrated in various ways, BUT—

Its use in Pole Cable Terminal construction was introduced by Frank B. Cook and that it gives complete satisfaction, is shown by the increasing demand for our Type M-4.

Type S-8 has the advantages of Type M-4 and, in addition, is equipped with Cook Tubular Fuses and Cook Improved Carbon Lightning Arresters.

WRITE FOR BULLETIN AND PRICES

Frank B. Cook.

Manufacturer

242 West Lake Street Chicago, Ill.

"ACME"

Rubber Covered Telephone Wires

The word "Acme" indicates the quality of wire we manufacture. Nothing better made because it is the best made.

Our weekly capacity is over

2,000,000 Feet

Your orders are assured of prompt and careful attention. Write us for samples and quotations.

THE ACME RUBBER MFG. CO.

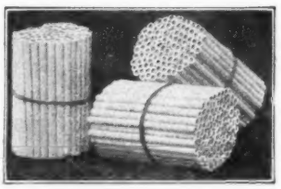
TRENTON, N. J.

Belden Lock-Stitch Twine

A pure flax twine, saturated in beeswax and ready for binding your special keyboard and switchboard cables.

BELDEN PAPER SPLICING SLEEVES

We have a large stock of the best quality. Write for our prices before placing your order.



JUST OUT---BELDEN CATALOG No. 4

100 pages of descriptive matter, cuts and prices of Wire, Cordage and Material used by telephone men; also 25 pages tables, formulas and new data on the design of windings, sent free on application by those engaged in the electrical business.

BELDEN MANUFACTURING COMPANY
194 MICHIGAN STREET, CHICAGO

Habirshaw Wire Co.

For All Services — HABIRSHAW WIRES CABLES AND CORES — High and Low Pressure

Offices
253 Broadway, New York.

Works
Yonkers, N. Y.

Rubber Covered Wires and Cables

N. I. R. Wires and Cables carried in stock by the MONARCH ELECTRIC & WIRE CO., Chicago, Ill.

For all Classes of High-Grade Electrical Service

National India Rubber Co.

BRISTOL, R. I. New York Office, 42 Broadway

Monnot Copper-Clad Steel Wire

LONG SPANS

You Can Safely Use A Long Span with Copper Clad

Lower First Cost { Fewer Poles / Fewer Insulators

Lower Maintenance Cost { No Slagging / Reduced Breaking

Manufactured By

DUPLEX METALS CO., 208 FIFTH AVE. NEW YORK

IRONITE

No matter how low the price of copper may be IRONITE is always cheaper, stronger and better.

Ask for a free sample.

DURANT ELECTRIC SUPPLIES CO.

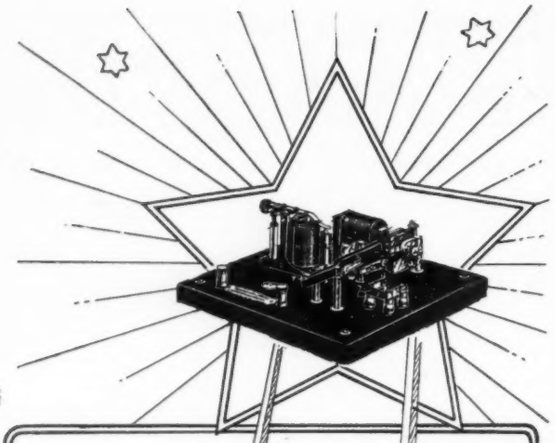
52 FIFTH AVE. :: :: :: CHICAGO

American Steel & Wire Company's

W. & M. Telephone Wire

IS made of materials selected and tested in all the stages from our own mines to the finished product. The employment of specially adapted metals is of greater importance in telephone wires, because not alone must tensile strength be considered, but electrical conductivity as well. To attain both these and in addition apply a quality of galvanizing that will effectually protect against weather conditions, is a triumph of the wiremaker's art. It is accomplished only with the greatest facilities for manufacture and an organization trained to the highest standard of excellence. Our brands illustrated below represent the best that experience, skill, facilities and hard and painstaking study can produce.

Chicago New York **AMERICAN STEEL & WIRE COMPANY** Denver San Francisco



DID YOU GUESS 12,500 *for* 1907 ?

11TH YR. What's Your Guess ?
10TH YR. 12500 in use — Best ever
9TH YR. 10500 in use — One infringer stopped
8TH YR. 9000 in use — everybody getting them
7TH YR. 7500 in use — All Sold on merit
6TH YR. 6000 in use — Patents Infringed
5TH YR. 4700 in use — Cheapest power on earth
4TH YR. 3200 in use — Perfect Satisfaction
3RD YR. 1500 in use — Customers Satisfied
2ND YR. 750 in use — Success Assured
1ST YR. 250 — Sent on trial

THE WARNER POLE CHANGER STANDS HIGH

YOU WANT THE BEST ORDER A WARNER AVOID IMITATIONS

Write for Catalog

WARNER ELECTRIC CO.

MUNCIE, INDIANA

THE WIRE OF "QUALITY"

Telephone Wire

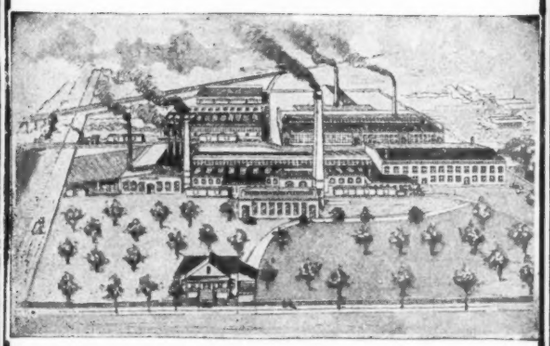
LONGEST LIFE
HIGHEST EFFICIENCY

Universities have tested our wire and found it of the highest quality.

Leading telephone companies have used it and found it satisfactory in trying service.

Experts can pick no flaws nor find any defects in our methods.

"A Difference in Wire Makes a Difference in Service"



Pioneer Manufacturres of Telephone Wire

We believe that you will like to deal with us and with our representatives

Indiana Steel & Wire Company

Muncie, Ind.

BEST BY "EVERY TEST"

OKONITE TRADE MARK REG. U.S. PAT. OFFICE.

THE STANDARD FOR RUBBER INSULATION

OKONITE TRADE MARK REG. U.S. PAT. OFFICE.

1889
Paris Exposition
Medal

OKONITE
TRADE MARK
REG. U.S. PATENT OFFICE.

1893
World's Fair
Medal

OKONITE WIRES MANSON TAPE
OKONITE TAPE
CANDEE WEATHER-PROOF WIRES
CANDEE PAT'D POT HEADS

WILLARD L. CANDEE,
H. DURANT CHEEVER, } Managers

GEO. T. MANSON, General Superintendent
W. H. HODGINS, Secretary
W. C. CANDEE, Asst. Secy.

SOLE MANUFACTURERS

253 BROADWAY THE OKONITE CO., LTD. NEW YORK CITY

Construction Material

GALVANIZED Telephone and Telegraph Wires, Cross Arms and Braces, Pins, Brackets, Insulators, Pole-Steps, Lag Screws, Clips, Machine Bolts, Carriage Bolts, Shims, Messenger Clamps, Lightning Arresters, Guy Anchors, Ground Rods.

Our Stock of Construction Material and Appliances is Complete and Adequate in Every Way. Send Us Your Orders.

Specify Okonite wherever a Rubber Covered Wire is needed.

OKONITE IT NEVER DISAPPOINTS

Central Electric Company.

264-266-268-270 FIFTH AVENUE CHICAGO

OKONITE IT NEVER DISAPPOINTS

THE FIBRE CONDUIT CO. REG. U.S. ORANGEBURG PAT. OFF. ORANGEBURG, N. Y.

Mr. Engineer:

If you are not employing ORANGEBURG FIBRE CONDUIT in your trunk line, service and central station work, the explanation probably is unfamiliarity with the advantages of the Orangeburg product.

Orangeburg Fibre Conduit

saves freightage and cartage, saves labor, saves time, saves cables; gives practically perfect insulation; is unaffected by gases, acids or the chemicals present in the earth; assures economical installation and satisfactory service in all classes of underground and station work.

All of which is shown in detail in the Conduit Book, which we send on request. Further, we will submit actual specimens of ORANGEBURG FIBRE CONDUIT, on intimation that such samples will be received and examined.

The Fibre Conduit Company

Main Office and Works:
Orangeburg, N. Y.

Chicago Office: 1741 Monadnock Building
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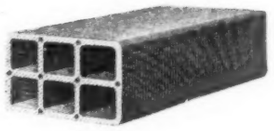

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HOW TO USE THE WILLIAMS TEST CLAMP

Hold clamp between thumb and first finger, then press together, causing the jaws to open wide. Insert the wire you are to test in the valley or groove and release the pressure, allowing the needle points to come down on the insulation with a clean bite. Then with the thumb on the stud or screwcap press the jaws together firmly. This will force the needles through the insulation, making a good contact with the conductor, which contact the spring steel jaws will hold steadily while the test is made. Send 75c. for a set (3) postpaid. Your money back if you want it.

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720 Electric Bldg. Cleveland, O.

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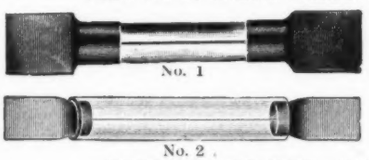
SEEN AT A GLANCE THRO THE GLASS



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THE "Veribest" Fuse
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The Most Perfect Fuse Made. The Wire is protected throughout. A Glass Enclosed Fuse.

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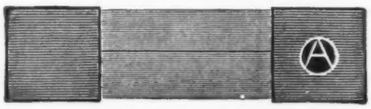

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A NEW STYLE

"PRICES TO POINT, WHERE IT IS ECONOMY TO USE THEM"

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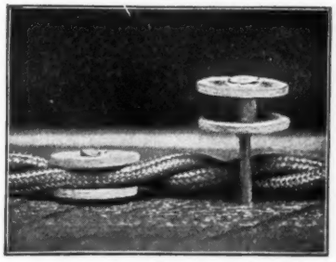

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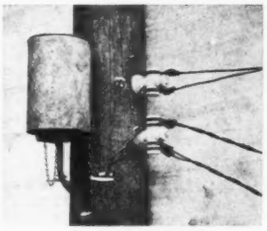
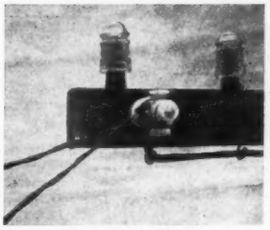


Suggestion No. 13



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Suggestion No. 5

Suggestion No. 8

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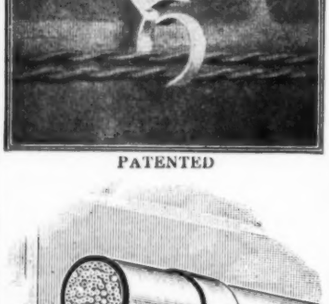

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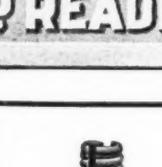

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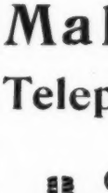

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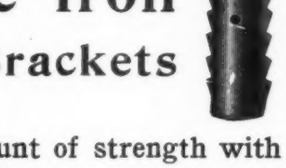

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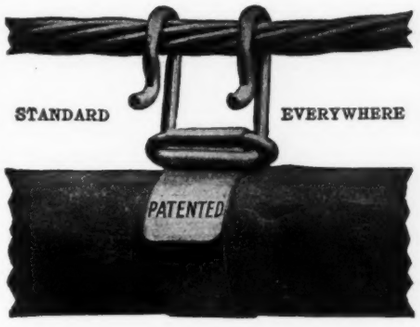

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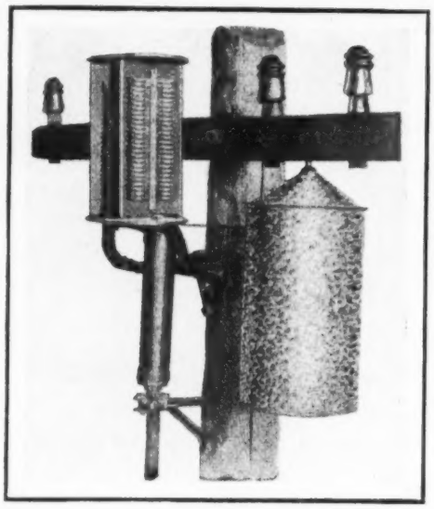

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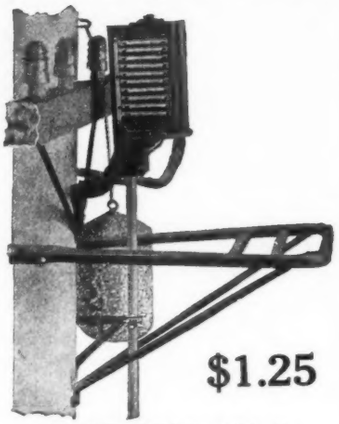
Simple and compact in design. Superior in workmanship. Cost of maintenance extremely low. Enclosed Fuses cost but **four cents each**.



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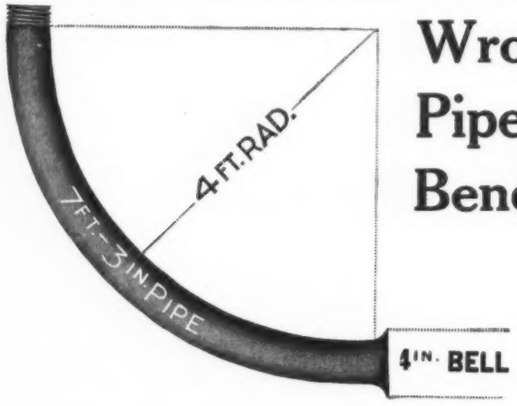

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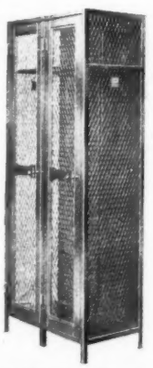

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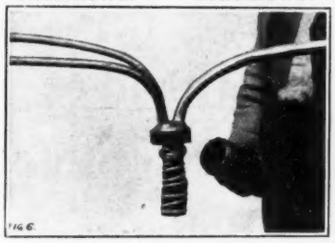

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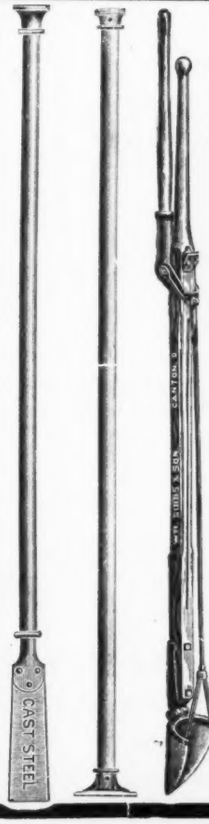

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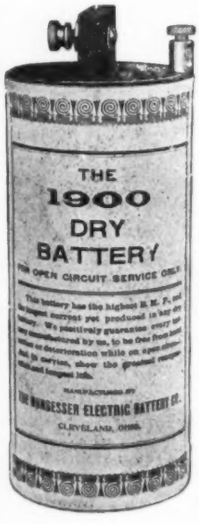

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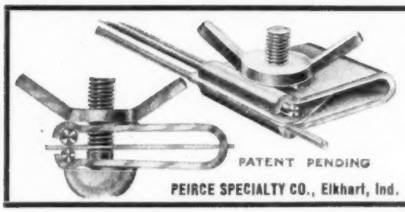

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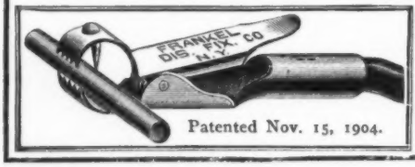

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Vol. XVI | CHICAGO, SATURDAY, SEPTEMBER 26, 1908 | No. 7

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Edited by H. B. McMeal and Franklin H. Reed

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Vol. 32	Telephone Magazine	No. 7
Vol. 18	American Telephone Journal	No. 13
Vol. 16	Sound Waves	No. 7
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CHICAGO, SATURDAY, SEPTEMBER 26, 1908

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A Foreign Calamity.

Perhaps first reports may be slightly exaggerated, but it is noteworthy that the great daily papers of the early part of the week have given to news of the unfortunate destruction of the Central Telephone Building in Paris, leading first page positions. This is because, with the loss of the toll switching equipment and the rupture of telegraph wires which are centered in the same building, commercial activity in one of the foremost cities of Europe is so handicapped as to slow down the business of the entire world. Of such importance has the telephone become! It is the active world's chosen medium of communication, carrying the force of personality into dealings with distant correspondents. With the breaking of the wires, communication drops back thirty years, and thousands of people in Paris, the French Provinces, and the hundreds of cities outside France reached directly and indirectly by lines whose terminals have been destroyed, will charge off a week of their business lives as lost through this great accident.

The officials of the French Department of Telephones will have the hearty sympathy of telephone men while they are working night and day to restore the service which has been so suddenly interrupted.

In other large commercial centers of the world there is a possibility that this accident may have a tendency to check the modern trend of engineering practice toward concentration of terminals of many exceedingly valuable lines under one roof. With every precaution taken to reduce the danger from fire to a minimum, the risk of great loss to a community from the destruction of a single building, when this happens to be the telephone exchange, is still worth considering; and business men, aware of this risk, might well voice a protest against too complete a centering of the wires at their disposal in a switchboard where all would be wiped out of service by a single disaster such as has just occurred in the French capital.

In New York City and some other great telephone centers of America, the trunking system is laid out with elaborate precautions for providing connections between any two exchanges in case a cable carrying direct wires is accidentally put out of commission. This same arrangement would, of course, suffice in the case of the destruction of a central office. This is a feature of sound practice which commends itself particularly to engineers disposed to be cautious, and provide an ample factor of safety in all

their work. The sub-division of plant by the provision of branch exchanges is usually carried out almost solely to economize in cable and duct charges, or, on the other hand, is reduced to a minimum in order to facilitate direct service through the elimination of a second switching operation in the trunk board. The financial equivalent of the element of risk in the concentration of too large switchboards in one building is not so easily calculated as are the annual charges on cable, but it is decidedly worth a careful consideration.

But, aside from any possible effect on future exchange design, this Paris accident brings home to our managers with new force the desirability of present action in eliminating fire risks. Too many exchanges, of all sizes, are inadequately provided with means for the prompt extinguishment of flames, and their employes are not properly instructed and drilled in the use of such appliances as are furnished. It is both a public duty and a matter of sound business policy to effect promptly such improvements in this respect as an examination of each local plant may show to be desirable.

Pushing the Installation of Extension Sets.

In working toward the telephone ultimate of an instrument in every home, it is easy to overlook the possibilities of the extension set in residential districts as a convenience to the customer and a business getter for the company. Particularly in the household is the opportunity great for securing additional revenue at very slight expense through the intelligent installation of additional instruments at a rental generally far below that of the primary telephone.

The extension telephone can be offered at a low rate for much the same reason that applies to the sale of central station current at low charges during off-peak periods. With the extension telephone no extra capacity in central office equipment or operating facilities is required, and the maintenance of the additional wiring connections on the premises is as nothing compared with the cost of keeping out-of-door leads in repair. All that the telephone company has to meet is the investment in the extension set and the fixed charges upon it, with the same expense per unit for interior maintenance and adjustment that applies to the first set placed in the house.

From the standpoint of the telephone user, the availability of an extension set does away with one of the chief annoyances that attend the use of a single instrument in a house covering considerable area or with parts separated by stories. As a convenience, or rather, necessity of modern civilized life, the telephone's advantages far outweigh its drawbacks. Yet, in the interest of good service and increased use in given communities, the telephone manager who does not realize that some slight disadvantages may now and then occur in the operation of a residence set shuts his eyes to conditions that can often be improved through either the relocation, or the addition of a set to the equipment of the premises. When the number of incoming calls each day is large, it is something of a burden for the average householder to answer the telephone if it involves frequent trips up or down stairs. There is no doubt that, as a means of lightening the tasks of a busy housewife, the extension telephone is one of the most effective agencies ever produced. It is an increasingly difficult matter to so locate a telephone in a residence that it will be equally convenient at all times of the day, and the best that can be done is in most instances a compromise between several desirable locations.

Where extension sets are not used, the telephone company does not always realize the influence that the location of the instrument has upon the satisfaction that the subscriber takes in its use, but in reality there is scarcely any more important problem in the relations of subscribers and operating companies than the proper location of the residence telephone. The extension set enables previous locations to be supplemented to the end of securing the maximum flexibility possible in a given installation.

The company which brings these points in a systematic way to the attention of patrons, pointing out the low cost of an extension set for house, stables, upper floors, library or chambers, will certainly reap a reward commensurate with the value of the service.

Providing for the Future.

Ample capacity for growing in central office floor space and in switchboard frameworks purchased seems to be a feature which is receiving proper attention from even the smaller companies nowadays, as is shown by an examination of recent orders filled by several leading manufacturers. Experience has left no room for doubt that a properly conducted exchange can count with certainty upon a fairly steady increase in its subscription list. As the labor cost is so considerable an item in the total makeup of switchboard installation charges, the advantage of reducing the cost per unit on all jobs after the first, by the provsion of adequate space for new equipment in the floor layout and frameworks, is obvious.

Economy in the way of provision for future requirements is not being confined to switchboard equipment, however. In recent issues of this paper, we published articles by two successful managers, one urging the economy of providing ample capacity in cable leads, and the other suggesting that the present time is a very good one for investigating the pole market.

A recent partial examination of cedar stocks and prices carried on by a member of our staff shows that this is, in fact, a good time to consider this subject of pole purchases. Telephone companies have been holding up construction work during the past year until they have actually got behind the demand for facilities. With the increase in business activity following a satisfactory settlement of the political situation which is predicted for next spring, large rush orders for construction material may be expected. While fairly large cedar stocks are on hand and prices are low, there will be comparatively little cutting done this winter, and the figures to which a sudden large demand would raise the price of poles next year is exceedingly problematical. Some companies, with a view to being on the safe side, are planning to discount this by purchasing a considerable supply for the future while they are able to come in on the present favorable market.

Out On The Lines In Florida

By P. P. Vyle

Florida's climatic conditions, more especially in that subtropical portion of the famous winter state represented on the map as a peninsula, its forests, it soil and its marshes, all combine to make telephone construction and maintenance a more congenial undertaking than in states where the climatic conditions are more variable and more severe.

The laws of Florida seem to be rather generously inclined toward telegraph and telephone companies. They give power to any regularly chartered telegraph or telephone company to condemn a right of way along any railroad bed in the State, subject to award by jury to the railroad company. This right of way provision is of inestimable value, because it frequently saves the wire companies the expense of blazing a right of way through the forests and affords protection from falling trees which are liable to put a line out of business at any moment when it is run through the woodlands. Then, again, should a line get out of order, the trouble-shooter stays aboard the train until he sees the source of the trouble. Then he gets off at the next station and walks back to repair the damage.

The statutes of Florida also permit telegraph and telephone companies to erect poles and string wires alongside any public road or highway in the State.

There are few large cities in Florida. In order to do business at a profit, a long-distance company has to tap a large number of small towns which run from three to eight miles apart and contain an average population of from 150 to 800 people, both black and white. (The colored people prefer a telephone talk to a telegram every time.) The larger cities have their local exchanges.

Over the sparsely settled country it is obvious that toll lines must run long distances and tap many turpentine stills, lumber camps and phosphate mines for the purpose of obtaining a paying revenue.

A Typical Florida Line, in Fairly Open Right-of-Way.

In the immensity of its forests Florida offers an abundance of cypress for poles. In various sections of the State there are cypress swamps of luxurious magnitude, from which a sufficient number of poles could be obtained to supply all the telegraph and telephone needs of the state for many years. The finest, straight-limb cypress poles can be bought at from 50 cents to $1.50 each f. o. b. siding. The wide distribution of the cypress swamps cuts down freight charges. Poles do not have to be hauled long distances for construction in Florida—they are usually cut near the working point.

Pertinent to the long-lasting qualities of Florida cypress, it is not out of place to remark that up to date the telegraph companies operating in this country use lag screws for bolting cross-arms to poles. Cypress has been recently discarded in favor of chestnut, which rots off at the ground in from seven to twelve years. The fault is not with the cypress, but with the method of bolting the cross-arms.

The cypress has a sap around its heart, and after the pole has stood for two to three years this sap rots, and the lag screws, which merely penetrate the sap, in the course of about five years fails to hold up the cross-arm, and the pole is condemned for that reason. The telegraph companies have cut down thousands of poles which are to-day as solid at the heart as the day they were put up. Had bolts been used, extending quite through the pole, instead of lag screws, the poles would be still holding the cross-arms and would be capable of holding them for years to come.

The prevailing rate for colored labor and the softness of the soil keep the expense of line erection at a minimum. In numberless instances one man has dug from 35 to 60 holes a day, using just a common or garden shovel. A digging tool is seldom used.

Railroad companies are required by law to distribute telephone and telegraph poles along their own right of way on payment of $10 per car in addition to freight. This minimum-of-expense method is generally adopted when the poles are hauled by the railroads, as nearly all the wire companies build on the outside border of the railroad's right of way.

The peninsula of Florida is one of the few sections of the United States that can be said to be entirely free from snow and sleet. The temperature remains at a happy mean through the year, practically giving a nine months' summer. In the depth of winter the air becomes bracing. The weather conditions eliminate the necessity for using heavy material and thus reduce construction cost. Poles can be spaced at a distance greater than is possible in the North without detrimental effects, there being no ice or snow to weight the wires to the ground and no frost to loosen the poles in the ground, with the other winter handicaps sustained by companies operating farther north.

In stretching wires no allowance for slack is made between poles for difference in length due to variation of temperature. Wires are pulled taut every half-mile with blocks and equalizers until the pulling scale indicates 450 lbs.

But it seems that there is no part of the world where telephone lines are not subject to their special troubles. If it is not one thing 'tis another. The great amount of heavy foliage in Florida and the thickness of the Spanish moss, which has more than a fondness for telephone wires, requires a continual clearing of lines. In places the vines grow so rankly that if the country lines are not given periodical attention they will be put

out of business by the foliage. Every wind that blows throws Spanish moss on the wires, and this being an air plant, it grows and grows and then some—just grows out of the air—and in wet weather is liable to cause short circuits and cross-talk.

A telephone right of way has to be cleared at least once a year. In addition to Spanish moss and vines, small gum trees and blackjack, a species of oak, will grow from 2 to 8 ft. during the year. Wherever the right of way is cleared through the forest it offers exceptional opportunities for the growth of this underbrush.

But the greatest liability to disaster is from forest fires, which burn down the poles, or weaken them so that they fall, or cause the falling of trees on the wires, overweighting them so that a section or two will go to the ground. For the last few years the rolling pine timber has been "boxed" and "back-boxed" for turpentine—which is one of the state's chief sources of revenue—and every heavy wind which sweeps through the forest from the Gulf or the Atlantic causes these pines, weakened by "boxing," to fall on the line.

The clearing of tree damage is one of the heaviest expenses long-distance companies have to contend with, as it is next to impossible, to slash a right of way through the forest 150 ft. wide, as would be required to eliminate the possibility of this type of trouble. When the lines leave the railroad they have to be built through the pine lands, and until the lumberjacks have devasted the state falling trees will constitute one of the greatest handicaps to uninterrupted telephonic communication in the country districts.

Telephone service is invaluable to the owners of truck farms and orange groves who are deeply interested in weather reports. Cold snaps in the early spring are sure to bring disaster unless notice is received in advance of their occurrence. Telephone companies receive the daily weather reports, and these reports are telephoned to any interested subscriber. If there has been a notice that a cold wave will come over night it will be but a short time before the protecting smoke smudge may be seen arising from the grove or orchard, and once again the North is assured of its fruit crop.

History of the Automatic Telephone*

By Arthur Bessey Smith

Assistant Professor in Telephone Engineering, Purdue University.

The New Bedford first selector is shown in diagram in Fig. 58. Two relays, a vertical and a rotary, are placed in series with the subscriber's line. They are of low resistance, 30 ohms, and shunted by a 150 ohm non-inductive resistance to permit the passage of talking current with as little impedance as possible. Each normally draws its current from battery through one of the two 500 ohm ringing relays.

The vertical relay controls the flow of current through the vertical magnet, the latter having for its duty the lifting of the wiper shaft carrying the private, vertical, and rotary wipers. The rotary relay controls the rotary magnet, the function of which is to rotate the wiper shaft. The two line relays each carry an auxiliary contact leading to the release magnet. If the line relays (vertical and rotary) are operated simultaneously, the release magnet will be energized, pulling the vertical and rotary detents from the ratchet cylinder.

The side switch has four members, numbered 1, 2, 3, and 4. In the machine all four are mounted compactly in one place, although in the diagram, for the purpose of simplifying the drawing of the circuits they are separated. Each is shown in its initial position.

"*S*" is the end of the side switch lever and rests in the angle of spring *A*, attached to the armature of the private magnet, *P*. A spring tends to move the side switch lever, *S*, to the right, as indicated by the arrow, and if allowed to move would switch all the members to their second position. The private magnet is connected to the private wiper, and also to spring 4 of the side switch, so that it is normally grounded.

"*F*" is a finger extending from the armature of the rotary magnet, and is so adjusted that when the latter is energized the finger presses upon and operates the armature of the private magnet.

The interrupter is kept running by a small motor. The off-normal switch is operated by a finger on the wiper shaft, so that when the shaft is down in its normal position the contact is pressed open. Only one upward impulse is required to close this contact. The vertical and rotary normals are the lines from the connector banks over which calls come to this line. The private normal occupies a contact in the private bank of the connector switch and it corresponds in position to the vertical and rotary normals.

In making a call, the first digit is sent in by grounding the vertical line a number of times, followed by one impulse on the rotary line. The mechanism for accomplishing this has been described previously. The vertical impulses energize the vertical relay, which in turn pulls up the vertical magnet, lifting the wipers to the desired level. The off-normal switch places battery on the private normal, to keep others from calling this line. The rotary impulse results in operating the rotary magnet once, this rotating the wipers as far as the first trunk line of the level at which they stand. At the same time the finger, *F*, of the rotary magnet operates the private magnet armature, stepping the side switch over to its second position. This causes a number of changes. At 1 and 3 it cuts off the 500 ohm ringing relays and the normal lines, and connects the vertical and rotary lines directly to the wipers. At 2 it cuts off the rotary magnet. At 4 it switches the private magnet from ground to negative battery through a 500 ohm

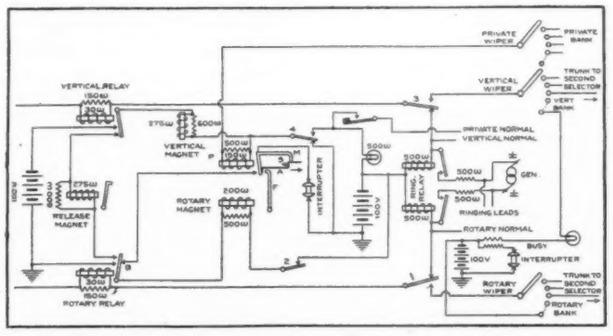


Fig. 58.—Diagram of the New Bedford First Selector.

lamp. This last places the "busy condition" on the private contact corresponding to the trunk which has been taken, so that no other first selector can stop there. Negative battery is the "busy condition.'

If the first few trunk lines had been busy, the procedure would have been as follows: The rotary impulse would rotate

*Continued from issue of September 12, 1908.

the wipers until they made the first contact, the rotary magnet finger, *F*, also pressing the private magnet armature. This allows *S*, the side-switch lever, to slip over the shoulder of spring *A* and strike the solid piece, *M*, which keeps it from moving farther. This slight motion is not sufficient to affect the side-switch members. Contact *C* is also closed. Since the first trunk is busy, its private contact will be "alive" with negative battery, and the private magnet will be locked up.

When the rotary relay falls back after the single impulse, its back contact, *B*, closes the rotary magnet circuit. The interrupter now gives pulsating current to the rotary magnet, causing it to step the wipers around. At every impulse the rotary armature finger holds the private magnet armature, while the private wiper slips from contact to contact. Between impulses the current in the private magnet holds it up so that the side-switch can not operate. But when a non-busy trunk is finally found, there will be nothing on its private contact. Hence the private magnet will have nothing to hold it up—the armature will fall back, breaking contact *C*, and allowing the side-switch to snap into its second position.

The call has now been trunked to a second selector, shown in Fig. 59. This is identical with the first selector, except that the 500 ohm ringing relays are replaced by 500 ohm retardation coils, and there are no normal lines nor off-normal switch.

The connector, Fig. 60, necessarily differs somewhat from

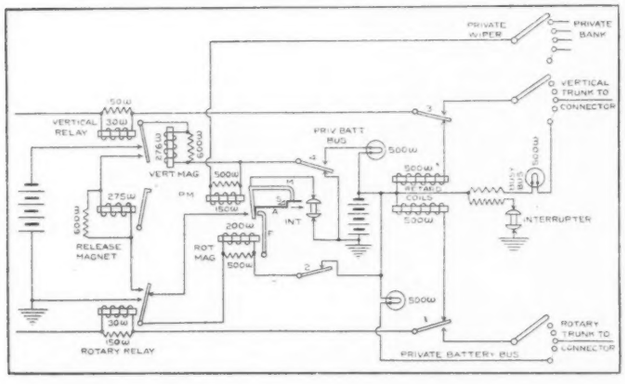


Fig. 59.—The Second Selector, New Bedford Automatic Exchange.

the selectors in that it has no trunk selection to make, the vertical and rotary steps corresponding to the last two digits in the call number. There is no finger on the rotary magnet. There is a small rod, *R*, attached to the vertical magnet armature, which extends through a hole in the solid arm, *M*, of the private magnet armature and the light spring, *D*, terminating in an adjustable head, *H*. The private magnet armature is shown in its normal position, close to the magnet. There is a feather cam on the wiper shaft which prevents the armature from moving away from the private magnet until the shaft has rotated at least one notch. A second cam is arranged to press the pawl of the vertical magnet away from the ratchet cylinder when the shaft has been rotated one notch or more.

The operation is as follows: The impulses for the tens digit come in over the vertical line, and lift the wiper shaft. The above mentioned cam prevents the private magnet from being disturbed. The single rotary impulse moves the shaft around one notch without causing the wipers to engage any contacts. The units impulses come in over the rotary line and rotate the wipers to the desired contact in that level. The last impulse comes in over the vertical line, energizing the vertical relay and magnet once. The second cam mentioned above prevents this from acting on the shaft, but through the rod, *R*, it pulls on the spring, *D*, and lifts the solid piece, *M*, letting the side-switch snap over into its second position. The side-switch thus connects the vertical and rotary lines to the called line, and performs the same other switching as in the selectors.

The calling station now has its lines extended to the first selector of the called station, arriving at that point over the normal lines. This leaves nothing across the line except the two 500 ohm ringing relays in the first selector of the called station. To ring, the ringing key at the calling station is

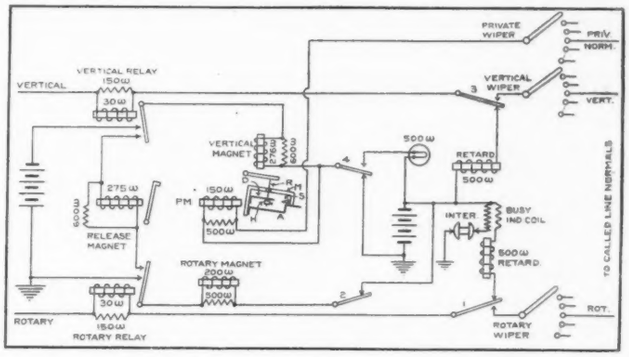


Fig. 60.—Diagram of the Connector Circuit.

pressed. As before described, this connects the bell across the line (in place of the receiver) and grounds the middle of the bell coils through 2000 ohms. The whole scheme is shown in Fig. 61. As will be clearly seen, this causes current to flow from the battery, through the ringing relays, through all the line relays, through both coils of the bell, and to ground through the 2000 ohms. This would pull up all the line relays, V_1, V_2, etc. (Vertical relays), and R_1, R_2, etc. (rotary relays), but for the limiting effect of the 2000 ohms resistance. Since the line relays are wound to 30 ohms each, and provided with a 150 ohm non-inductive shunt, they are not as sensitive as the ringing relays, which are 500 ohms. Consequently, the latter alone pull up, connecting ringing current to the line.

A peculiarity in ringing will be noticed in that this caused the bells of both stations to ring. In a way this seemed to be a good feature, as it permitted the calling subscriber to know that something was happening while he pressed the ringing button. This ringing circuit was the invention of Mr. T. G. Martin, then of the Strowger company. In common with most schemes where dependence is placed on the marginal action of relays, it required very careful adjusting to keep the switches working smoothly.

The action of the connector, if the called line is busy, will be seen by reference again to Fig. 60. Imagine the vertical and rotary motions to have been completed, the wipers resting on the called line and its private, and we are ready for the final single impulse which comes in over the vertical line.

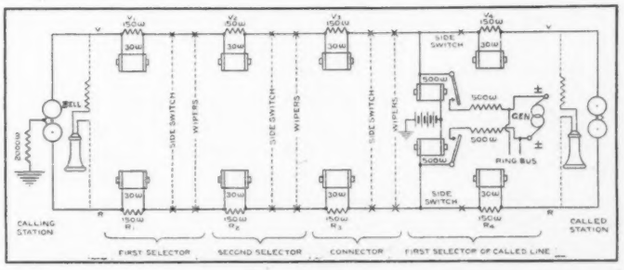


Fig. 61.—Circuit Illustrating the Talking and Ringing Conditions.

The called line being busy its private contact, on which our private wiper is resting, will have negative battery on it. Through side-switch 4 our private magnet is grounded, so that the circuit is completed and battery current will flow through the latter, locking its armature where shown. When the final

vertical impulse comes in, it will energize the vertical magnet and pulling on spring *D*. But owing to the locking current the private magnet will not move, and the side switch levers, 1 and 3, will remain normal, where shown in the figure. In this way the called line can not be disturbed. While listening for the called stations to answer, the calling subscriber will hear the busy tone, which comes in through the two 500 ohm retardation coils.

The talking circuit of a completed connection is outlined in Fig. 61, which has been used to illustrate the system of ringing. It will be seen that there are eight line relays in series, four in each side of the circuit. Each is shunted by 150 ohms of non-inductive resistance, which makes it not quite as bad for transmission purposes as it might be. Yet it seems that it would be bad enough. There are two 500 ohm relays bridged across the line with battery tied to the center and to ground. This makes 1000 ohms of highly inductive resistance, which is entirely permissible and good engineering. There are fourteen contacts between the two subscribers, counting only those in the switches. Six of them are wiper contacts, which may be very good, since they are wiping contracts and may have sufficient pressure to cut through ordinary dust. The remaining eight contacts are in the various side switches, and if made of platinum, as they were, have the possibility of doing good work, though not as good as the modern side-switch, with its wiping contracts.

In disconnecting, the vertical and rotary lines were momentarily grounded by the springs on the hookswitch at the calling station. This action has been described in detail. Since this is a ground through zero resistance all the relays shown in Fig. 61, will be pulled up. As has been shown in connection with the description of the first selector, this will energize the release magnet of each switch, restoring all machines to their normal positions. A mechanical device also resets the side switch by the rotary motion of the shaft.

This system possessed many features in common with the modern automatic. It marked the beginning of modern success, though as yet very imperfect. Two points may be mentioned, points which have been more or less discarded. Each magnet in the switch was shunted by a certain non-inductive resistance. This was to reduce or kill the excessive spark at the contacts of the relay which fed current to that magnet. One hundred volts was the battery pressure used for the operation of the system.

Referring again to Fig. 58, attention may be directed to the busy test wired to the last contacts of the first selector bank. In case all the trunks were busy, the wipers would be carried to this last point, where the busy signal would give the subscriber warning. Moreover, the chattering of this switch would call the attention of the attendant to the fact that something was wrong.

(To be continued)

The Basis of Taxation

A Brief Digest of Tax Laws of the Different States, Showing the Basis for the Taxation of Telephone Companies

Compiled by A. H. McMillan

Alabama: Returns to the State Auditor must be made by all companies of the number of miles of wire in the state, the number of poles, batteries, instruments and articles of all kinds, specifying the counties and items of property in each. The auditor reports to the State Board of Assessment, and the board values and assesses such property for taxation, having power to add 50 per cent if the company does not make return in the proper time. All other property is reported to and assessed by the tax assessors of the county in which it is taxable.

Civil Code of Alabama, 1896, Sec. 3974 to 3976.

Arkansas: A sworn statement to the assessor of the county is required, showing the amount of capital stock and number of shares into which it is divided; the amount of stock paid up and its market or actual value, all indebtedness except for current expenses, and for purchase and improvement of property, and a true valuation of all tangible property. Upon this basis taxes are assessed.

Digest Statutes, 1904, Sec. 6936.

California: Like other property.

Connecticut: A tax of 75 cents is paid to the state on every telephone instrument, and twenty-five cents for each mile of wire controlled or operated by the company, in lieu of all other taxes except on real estate, which is taxed like other property.

Gen. Statutes of Conn., (1902), Sec. 2438.

Delaware: Sixty cents per mile for the longest wire in the state; 30 cents per mile for the next longest, and 20 cents per mile for every other wire in the state.

Revised Code of 1852 as amended in 1893, Chap. 128, p. 72.

Florida: License taxes as follows: On companies having a capital stock of $100,000 or more, $100; stock of $50,000 to $100,000, $50; stock of $25,000 to $50,000, $30; stock of less than $25,000, $20; stock of less than $10,000, $10.

Telephone lines are returned and assessed like railroads, which are assessed by the county, return being made to the Comptroller of the State.

Laws of Florida, 1895, Chap. 4322, p. 12; Sec. 9, Laws of 1897, p. 7, Sec. 8.

Georgia: Like other property.

Idaho: Like other property.

Illinois: Like other property.

Indiana: Like other property.

Iowa: Assessment includes all property of every kind, and properties so included shall not be taxed in any other manner. The executive council has to determine the actual cash value of this property, and deducts from it the value of property in local taxing districts, assessing on the balance. The actual value per mile is determined by the executive council by dividing the total value by the number of miles of line in the state. The taxable value is obtained by taking the percentage of actual value, the ratio between the actual value and the assessed or taxable value being required to be the same as in the case of property of private individuals. The executive council then multiplies the taxable value per mile by the number of miles in each county and certifies that result to the County Auditor. The property in local taxing districts which was deducted in determining the actual cash value of the land is locally assessed.

Laws of Iowa, Code of 1897, Secs. 1328, 1330 and 1331. Laws of Iowa, 28 G. A., Ch. 42, Secs. 1, 2 and 3.

Kansas: The Board of Appraisers and Assessors reports to the Auditor of State the total value of the company's property in the state. This he determines from the reports of the companies, showing par value of stock, value of realty, length of lines in the state and number of miles of wire in each county; an inventory of all other property and total gross

receipts in the state. The Auditor of State deducts from the total assessed value the value of realty. The value remaining is then apportioned among the several counties through which the lines run in the proportion that the length of line of the company in the county bears to the length of its whole line in the state. The Auditor of State then certifies to the County Clerk the amount apportioned to his county, and he certifies to the township, school district, and city, its share. This law does not apply to any company doing business wholly in one county.

Gen. Statutes of 1901, Secs. 7530 to 7540. Laws of Kansas, 1905, Chapter 502.

Kentucky: This state requires the payment of franchise taxes to itself in addition to other taxes, and the payment of a local tax on franchise to the county, city, town, taxing district, etc., where the franchise is exercised. The state board of valuation and assessment fixes the value of capital stock, and deducts the assessed value of all tangible property assessed in the state or in counties where situated. In the case of foreign corporations, doing business in the state, the board determines from the amount of gross receipts in the state, and elsewhere, the proportion which the gross receipts in the state bears to the entire gross receipts, and takes such proportion of value of the entire capital stock less the tangible property, assessed in the state or county where situated, as a basis of taxation.

Carroll's statutes, 1903, Secs. 4077 to 4088.

Louisiana: The state board of appraisers and assessors assesses the property of telephone companies according to reports required from them.

Act. 226 of G. A., 1904.

Maine: Companies pay an annual excise tax for the privilege of conducting business, which, with local taxes on real estate, is in place of all other taxes on property and shares of capital stock. There is apportioned and paid to the several cities and towns in which is held stock of the corporation or in which lives the owner of an interest in a telephone line not incorporated, an amount equal to one per cent of the value of the stock as determined by the board of state assessors, if the company is a corporation; if not, such a proportion of the amount of the tax as the interest of the person bears to the whole ownership. The total is required not to exceed the sum received as taxes, nor be more than the proportion the amount of capital stock in the state bears to the whole capital stock.

The tax is ascertained as follows: When the gross receipts from business in the state for the year exceed $1,000 and is not less than $500, 1¼ per cent of the gross receipts; on receipts of from $5,000 to $10,000, 1½ per cent; receipts of from $10,000 to $25,000, 1¾ per cent; on receipts of from $25,000 to $50,000, 2 per cent. One-fourth of 1 per cent is added for each additional $25,000 of gross receipts or fraction thereof, but the percentage must never be more than 4 per cent.

Revised Statutes of 1908, Sec. 35 to 41.

Maryland: A franchise tax of 2 per cent is levied on the gross receipts. This is paid on the proportion of gross earnings received in the state, being determined by the proportion of the whole line to that part of the line within the state.

Public Gen. Laws, 1904, Article 81, Sec. 164.

Massachusetts: The tax commissioner is required to ascertain the true market value of the shares of each corporation, and estimate therefrom the fair cash value of all the shares, which shall be taken to be the true value of the corporate franchise. For domestic telephone companies, he must deduct the amount and market value of stock in other corporations on which tax is paid. For a foreign telephone company, he deducts so much of the value of the capital stock as is proportional to the number of telephones used or controlled by it or under letters patent, owned or controlled by it without the commonwealth. For both foreign and domestic corporations he deducts the value of realty and machinery subject to local taxation within the commonwealth.

Revised Laws, 1902, Chap. 14, Secs. 37 and 38.

Michigan: In lieu of all other taxes, telephone companies pay a specific tax upon property in business equal to the amount, computed as follows:

Upon the gross receipts derived from business within the state for a year, 3 per cent; real estate not actually occupied in the exercise of this franchise, and not necessary to the proper operation of its business is assessed like all other real estate.

Act 179 of the Public Acts of 1899, Sec. 5.

Minnesota: Telephone companies pay a gross earnings tax of 3 per cent derived from business in the state in lieu of all other taxes. Realty owned by and used in its business is exempt from ordinary taxation, but this does not apply to realty purchased by the company after May 1st, 1905.

Revised Laws of 1905, Sec. 1035; 84 Minn., 459; 87 N. W., 1131; 80 Minn., 17; 82 N. W., 1090.

Mississippi: Privilege taxes are required from telephone exchanges as follows: On each exchange with 20 subscribers or less, $2.50; with 20 to 35 subscribers, $5.00; from 35 to 50 subscribers, $7.50; from 50 to 75 subscribers, $12.50; from 75 to 100 subscribers, $17.50; from 100 to 150 subscribers, $37.50; over 150 subscribers, $50. Long distance lines with 1000 miles or more of pole line pay $100, and for every mile less than 1000 miles, 10 cents per mile. Company also pays the same taxes required of individuals.

Chapter 76, Laws 1904.

Missouri: Franchises of telephone companies are taxed like private property, upon returns required for the purposes.

Page 223 of Laws of 1901.

Montana: Each company pays a license of 75 cents per year for each instrument in use. Besides this, the companies pay the same taxes as individuals.

Act 269 of 1897.

Nebraska: Assessment is on the value of line per mile to be determined by dividing the sum of the whole valuation, which is made by the state board of equalization, by the number of miles in the state, multiplying the result by the number of miles in each county, and certifying the amount to the county clerk.

Compiled Statutes of 1895, Sec. 4320.

Nevada: Taxed like individuals.

New Hampshire: Real estate is taxable where situated. Besides real estate tax, a company pays an annual tax on the value of the line including poles, wires, instruments, apparatus, furniture and fixtures at the rate to be as nearly as possible the same as that levied on other property. These taxes are in lieu of all other taxes, including taxes on stock, except as to realty.

Public Statutes of 1901, Chapter 64, Secs. 3 and 12.

New Jersey: Taxed like individuals.

New Mexico: Taxed like individuals.

New York: The valuation of each special franchise subject to assessment of each taxing district is determined by the state board of tax commissioners, and included by the assessors in the assessment roll. This assessment is in addition to the assessment on the other property, which is determined by the same principles that govern individuals.

1 Laws of New York, 1902, Chapter 908, Sec. 42.

North Carolina: Here there is a tax of 2½ per cent on gross receipts reckoning and deducting the proportion of interstate business done within the state. If an affidavit is filed showing that one-fourth the entire assets are invested in state or municipal bonds, the tax is only 1½ per cent. If one-half the total assets are so invested, it is only 1 per cent; if three-fourths, it is only one-half of 1 per cent. Returns are made to the Treasurer of State. No city or town shall impose an additional tax, license or fee, except an *ad valorem* tax. The

annual corporation franchise tax does not apply to telephone companies.

Secs. 5189, 5190, Revisal of 1905.

North Dakota: Here the valuation of the line per mile is determined and apportioned to each county according to the number of miles therein.

Revised Codes of 1905, Secs. 1534 to 1537.

Ohio: The Auditor of State charges and collects a sum in the nature of an excise tax of 1 per cent of the amount fixed by the state board of appraisers and assessors as gross receipts from business within the state. This does not exempt tangible property.

Laws of 1904, Secs. 2780, 18 to 21.

Oregon: Assessed like other property.

Pennsylvania: Assessed like other property.

Rhode Island: One per cent of the gross receipts is paid to the state in lieu of all other taxes on company's lines. Every corporation that shall accept special rights must return its gross receipts to the city or other municipal body granting such rights, and pay a special tax of 3 per cent upon its gross receipts. If the company does business in two or more towns, and is unable to ascertain the gross receipts in each, they shall be divided according to the length of wires in each town.

Gen. Laws of 1896, Chapter 77, Sec. 3.

South Carolina: Here the assessment is upon the true cash value of all property which is obtained by adding to the market value of the stock or value of the capital, the aggregate amount of mortgages and encumbrances. From the gross value ascertained by statements to state board of assessors, who assess the property, is deducted the assessed value of real estate, not specifically used in the general business of the corporation. Such realty is assessed like other real estate. The amount of the true cash value within the state is gotten by taking the proportion which the length of line in the state bears to the total length. The balance is assessed to the corporation. The value per mile is ascertained, and this is multiplied by the mileage in each county, and the result apportioned to the counties and by them to the several townships.

Code of 1902, Secs. 288 to 295.

South Dakota: The value of all property in the state is assessed by the state board of assessment and equalization, statements by companies to the Auditor General being taken into consideration.

Revised Code of 1903, Secs. 2126 to 2133.

Tennessee: "Distributable property" is the basis of taxation. From its total value, $1000 is deducted, and the balance divided by the number of miles in the state. The value per mile is then multiplied by the number of miles in state, county, city and township for taxation. Bonds are assessable as distributable property.

Supplement to Code 824 to 859, Secs. 2 and 7.

Texas: Assessed like other property.

Utah: The value of property and franchise is assessed by the state board of equalization, or by the city or county granting the franchise. The assessable property is apportioned among the several counties and lesser taxing districts through which the line runs in proportion to the value thereof in each taxing district.

Laws of 1899, Chapter 68, Secs. 2513, 2559 and 2562.

Vermont: Taxes of 3 per cent are assessed on the entire gross earnings from business wholly within the state, including sums received for rentals of telephones. The state corporation commissioners assess, upon property of the telephone company, the tax imposed by law.

Statutes of 1894, Sec. 565.

Virginia: Unincorporated companies and individuals must pay not less than $1.25 for one mile of wire and 25 cents for every additional mile. For the privilege of operating, there is a license tax of $2 per mile on every line of poles or conduits, and an additional charge of 2 per cent of the gross receipts. For small companies this is less. There is also a tax of 20 cents per $100 assessed value of realty; 25 cents per $100 for tangible property for the support of the government; 10 cents per $100 for the support of public free schools and 5 cents per $100 of the assessed value of realty and tangible property for pensions.

Washington: Assessment based on value of property determined by amount of capital stock.

Laws of 1891, Sec. 39, p. 294.

West Virginia: Assessment is upon the value of property apportioned according to mileage.

Act of 1905.

Wisconsin: Assessed like other property.

Wyoming: Assessed like other property.

New Toll Line in Pennsylvania.

The Anthracite Telephone Company (Independent), operating an exchange at Forest City, Pa., and serving Vandling, Clifford, Crystal Lake, Dundaff and other points in eastern Susquehanna county, and the Montrose Telephone & Telegraph Company (Independent), operating an exchange in Montrose, Pa., and serving Hartford, Alfred, New Milford, Halstead and other points in western Susquehanna county, have jointly completed a copper metallic toll line between Forest City and Montrose, a distance of 35 miles.

The new toll line is proving a great public convenience, because it connects the largest town, Forest City, with the county seat, Montrose, thus filling a long felt want. This territory has practically been abandoned by the Bell Telephone Company, except for long distance business. The new line will give Forest City direct connection with Binghamton, Elmira, Owego, Oneonta, Ithaca and other New York State points.

The Anthracite Telephone Company is operating over 200 telephones, while the Montrose Telephone & Telegraph Company has now a list of nearly 600 subscribers. Both companies have the best obtainable equipment for long distance business. Each connects with the extensive system of the American Union Telephone Company, recently formed for the purpose of consolidating many of the Independent telephone companies of Pennsylvania and other neighboring states into a homogeneous system; the lines of the Consolidated Telephone Company of Pennsylvania, just merged with the American Union, connect with the Anthracite company's exchange at Carbondale, Pa.

All of these companies are energetically competing with the Bell Telephone Company throughout their entire territory. The Independent telephone movement has, in fact, recently shown a marked development, being apparently unchecked by the serious financial and industrial depression.

Montana Independent Company Furnishes Service During State Convention.

Long distance telephone connection between Butte and Anaconda has recently been perfected, and during the recent Democratic state convention at Anaconda, the visitors were accorded free use of the telephone to Butte. This privilege was taken advantage of by many and the service given was most satisfactory.

Anaconda is the first city in Montana to have interurban communication with Butte. Within the next few weeks the lines will be completed over the Divide to the east of the city, establishing communication with Logan and all eastern Montana points where Independent telephones are in operation. Helena will be the next city to connect with Butte and connection will then be made with Great Falls. The officials of the telephone company state that within a short time Montana will be covered with a network of Independent telephone wires.

Modern Toll Switchboard Equipment*

By J. E. Hilbish, J. B. Thiess and G. A. Joy

Continuing the discussion of the compositing of telephone lines begun in the previous article, we wish to show one more circuit in which some very ingenious ideas are utilized. This circuit is special, in that it is not used by the telephone companies, but rather by the railroads of the country on their regular telegraph lines. It is in very extensive use in the Western States, but has not met with much favor in the East. This is due to the fact that railroad stations and hence telegraph terminals are much more frequent in the East, as the country is more densely populated, and consequently the need of equipment such as we are about to describe is not felt very keenly. By referring to the circuit, Fig. 37, it will be noted that the telephone circuit terminates in a regular subscriber's set instead of a jack, as in those previously explained. This set contains all the apparatus required for a telephone terminal tap, and therefore the work of installing a telephone set in this sort of a line consists in merely stringing a lead from the line wire to the instrument. This simplicity of installation is one of the valuable features of the circuit, and is made use of as follows:

As has been previously stated the distance intervening between telegraph stations on the western railroad lines is often very great, and, therefore, if a train were to be wrecked midway between two of these stations it would take some time for a man to walk to the nearest telegraph station to signal for aid. However, if the train were equipped with one of these sets, the message could very readily be sent at once, since the train crew could simply tap the wire and call in by the telephone, and thus the loss of much valuable time and serious delays could be avoided. These instruments, when installed on a train, are usually equipped with a pole, the end of which terminates in a metallic hook which is wired to the telephone set. Consequently all that is necessary to make the telephone operative is to catch the hook on a line that is composited, the rails serving for the ground return. The telephone proper is nothing more nor less than an ordinary local battery set, equipped with a special induction coil which is utilized in speech transmission, as well as in the generating of the signaling current. The sets are not equipped with ringers, these being replaced by a special signaling device (H) as shown in the circuit (Fig. 37). The operation of this piece of apparatus is identical with that of the so-called "howler," which is the term applied to the operation of an ordinary subscriber's receiver when it is traversed by an alternating current of high frequency sent out on the line by the wire chief to inform the subscriber that his receiver has not been placed upon the hook. When this high frequency current traverses the coils of the receiver, its diaphragm is set into very rapid vibration which causes the emission of a very penetrating, shrill note. In this howler (H) especially designed for the railway set, the diaphragm is made of heavier stock than is used in the ordinary receiver, and consequently the metal is not distorted or its resiliency reduced by the repeated rapid vibration of comparatively large amplitudes to which it is exposed.

In order to facilitate a description of the operation of the circuit shown in Fig. 37, we will first devote our entire attention to the telegraph circuit, and then take up the telephone circuit. The telegraph operator at M, upon operating the key, will send a pulsating current through relay R to point X. At this point, as was explained in the previous article, part of the current will charge the condenser F and the rest will traverse the windings of coil Z and pass out on the line. The combined effect of this capacity and inductance will round off the corners of the current wave as generated by the telegraph key, and thus cause it to appear out on the line as a fairly smooth wave, in which condition it is not as liable to interfere with the telephone conversation. The telegraph current having reached the line, as stated above, will flow over the line wire until it reaches an intermediate telegraph station, such as is shown in the circuit, at which point it has a choice of three paths; one by way of relay D, another through the 1,000 ohm non-inductive resistance B, and a third by way of condenser A. However, since the telegraph current is pulsating in nature, it will not flow through condenser A, but will rather choose the paths offered by resistance B and relay R. Since the resistance coil B is wound to 1,000 ohms and the Morse relay D to but 150, the greater part of the current will traverse the coil of the relay, and hence out on the line again. The function of resistance B is to take up the inductive "kick" of the relay coil D when the telegraph circuit is opened, rather than let it pass through the telephone to ground, while condenser A retards the passage of current over the telephone circuit when the telegraph operator at key L is sending and is thus opening and closing the circuit. The current will consequently operate telegraph relay D and all other intermediate telegraph relays in the line, and will then pass by means of coil Z' through relay R' at the other end of the line and hence to battery and ground. The operation of any telegraph key will consequently actuate all the telegraph relays in the line, and will not interfere with the telephone circuits, as the telegraph current is kept out of these circuits by means of condensers G and G', due to the fact that

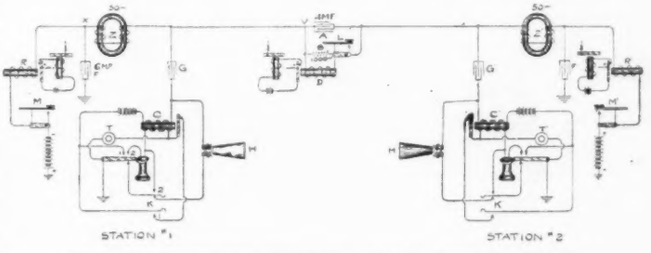


Fig. 37.—Composite Telephone and Telegraph Circuit.

the frequency of the current, as generated by the manual operation of the key is comparatively low and hence the impedance offered by these condensers is very much higher than that of the coils Z and Z'.

We have thus shown that the telegraph circuit does not interfere with the operation of the telephone circuit and therefore it remains to be explained how the telephone talking and ringing currents are transmitted without interfering with the telegraph circuit. It will be noted that the telephone sets are wired in multiple, and, therefore, when signaling current is sent out on the line all the telephone instruments will respond. It follows that a coded signal system must be resorted to with this circuit. Fig. 37 shows but two telephone sets and one intermediate telegraph station, but it is generally conceded that the circuit will operate satisfactorily with five intermediate telegraph and a like number of telephone stations, the extra stations being omitted from the drawing to obviate repetition and to reduce its size. The operation of the telephone circuit is as follows: When a trainman at station No. 1 desires to call another telephone station he will actuate key K the required number of times, to obtain the coded ring of the station desired, with the following results. In the first place a circuit is completed that is traceable as follows: From battery by means of the primary of the induction coil to the armature of the coil, and thence by means of the break contact to contact 1 of key K, and then by way of the lever spring of that key to the other side of bat-

*Article number 10. Previous articles were published in monthly issues of Telephony.

tery. This induction coil is very similar to the regular local battery subscriber's set coil, with the additional feature that it is equipped with an armature and a break contact. Thus, when the above outlined circuit is completed the primary of the coil is energized, and will therefore attract the armature, which will subsequently break the circuit. The breaking of the circuit will release the armature, and thus close the circuit again, thereby energizing the primary of the coil and causing the reattractions of its armature, etc., repeatedly. Thus the operation of the circuit just closed is identical to that of an ordinary buzzer or vibrating bell. This action, however, is the means of generating the signaling current, accomplished as follows:

When the circuit through the primary is closed, a field of force is established which cuts the turns of wire in the secondary winding of the coil, and thus generates an E. M. F. in this winding, while upon the opening of the primary circuit an E. M. F. of opposite polarity is generated in the secondary coil. Therefore, since the turns in the secondary winding greatly exceed those of the primary, there is generated in the secondary an alternating current whose potential is much greater than that impressed upon the primary, and whose frequency is

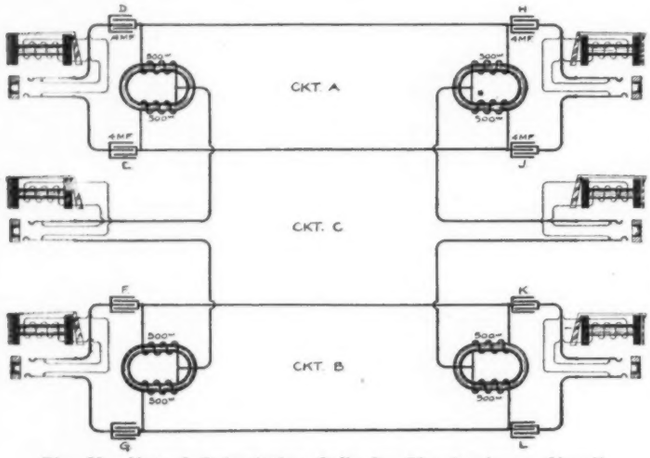


Fig. 38.—Use of Retardation Coils for Phantoming a Circuit.

equal to the rate of vibration of the armature. This alternating current will seek a path which can be traced from the ground on the switch hook to the break contact of the hook, to the lever spring of key K, and thence by means of contact 2 through the secondary of the induction coil and condenser G out on the line. Due to the inductance of coil Z, it offers considerable impedance to an alternating current of high frequency, and therefore the current will pass out on the line to point V. At this junction it may traverse any one of the three parallel paths as offered by the relay D, the non-inductive resistance B and the condenser A, and as the latter two paths offer the circuit of least impedance to a high frequency alternating current, it is obvious that current will pass over these paths. In case a small portion of the current should pass through relay D, however, it will not cause the attraction of its armature, since the rapid alternation of the current would prevent the building up of enough magnetic energy to overcome the inertia of the controlling spring. The signaling current will, upon traversing the intermediate telegraph station flow over the line to condenser G' and hence, by way of howler H', the break contact of key K', its lever spring and the break contact of the switch hook and the switch hook itself, to ground. Thus the howler will be energized, and will consequently emit the signal in accordance with the code sent by key K.

Having sent the required signal, our trainman is now ready to converse, and will therefore remove his receiver from the hook. This operation will close the primary circuit, which can be traced from battery through the primary of the induction coil, and hence by way of the transmitter and the switch hook to hook contact 1 and the other side of battery, while his secondary circuit can be traced from ground by way of the switch hook, hook contact 2, the receiver, secondary of the induction coil and condenser G out on the line. Since the circuit conditions in the other set are identical to those just described for station 1, we see that the talking circuit is complete, and since the talking current is of a very high frequency it will choose the path as outlined for the signaling current. Conversation is therefore possible without any interference of the telephone with the telegraph current and vice versa.

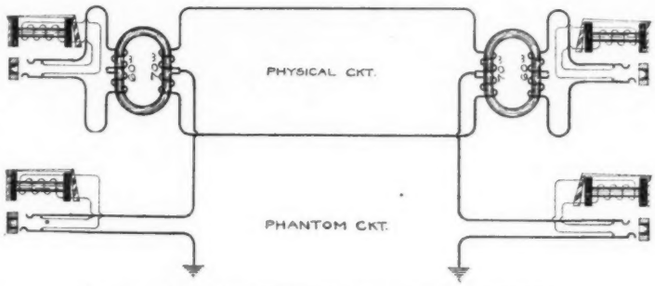


Fig. 39.—Circuit Phantomed for Duplex Telephony.

The telephone circuit, being a ground return circuit, is naturally susceptible to the noises inherent in all grounded systems and therefore not as quiet as a metallic line, and, furthermore, since it is not possible to transpose it, is subject to inductive disturbance from other telegraph circuits that parallel it. But this disturbance is at no time so great as to make the circuit inoperative. However, this difficulty has a tendency to reduce the distance over which the operation of the circuit is practical to about one hundred miles. This disturbance is reduced to a certain extent by using a receiver that is not as sensitive as those ordinarily used. When this scheme is adopted, however, the transmitter must be made as powerful as possible and consequently the number of cells in the primary circuit is increased to seven or eight.

As we have shown the various schemes used in increasing the revenue obtainable from the telephone circuits by means of a combination of the telephone and telegraph, it is therefore essential that we show how a telephone circuit may be arranged so as to increase its talking efficiency. There are two general

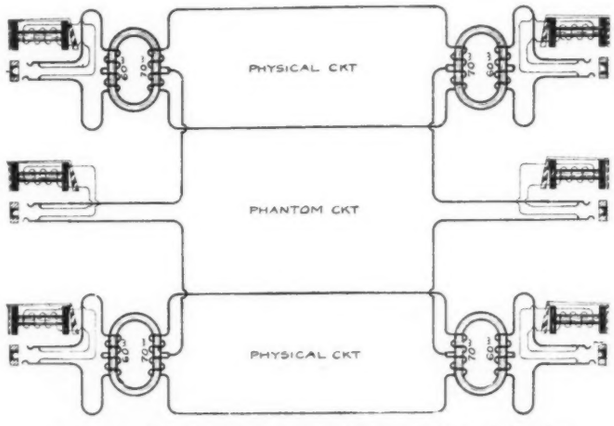


Fig. 40.—Circuit Phantomed with Repeating Coils for Multiplex Telephony.

methods in use, one by means of which the apparatus is so arranged that two conversations may be held over the same pair of wires simultaneously, termed duplex telephony, and the other an arrangement of apparatus by means of which three telephone conversations may be held over two pair of wires simultaneously, called multiplex telephony. These results may be brought about, as in the case of simplexing, by the use of retardation or repeating coils. In Fig. 38 we have shown how

four retardation coils may be inserted into two metallic line circuits so as to obtain the additional telephone circuit. In this case, the two regular circuits *A* and *B* are called the "physical" circuits, while circuit *C* is termed the "phantom" circuit. The retardation coils are, as will be observed, bridged directly across the line, and the tap for the phantom circuit is taken from the middle points of these coils. Thus the two line wires of each of the physical circuits are operated in parallel for each limb of the phantom circuit, whose line resistance is consequently but half as great as that of the physical circuits. The condensers *D*, *E*, *F*, *G*, etc., are, as will be observed, inserted in the line on the switchboard side of the retardation coil and usually have a rating of about 4 M. F. These condensers are not necessary for the satisfactory operation of the phantom, and are only used in this connection so that the physical circuit may be used for simplexing when phantom work is not desired, in which case they keep the telegraph currents out of the telephone circuit, and also aid in smoothing out the telegraph wave. The ringing, as well as the talking current from the phantom circuit, has no difficulty in flowing through the retardation coils, since the telephone tap is taken from the center and therefore the inductance of one-half of this coil is neutralized by that of the other, and the coil as a whole consequently acts like a non-inductive resistance. However, to an alternating current flowing in circuits *A* or *B* these coils offer their full impedance, and these currents are therefore forced through the condensers and hence through the drop or telephone set. Thus it is obvious that signaling or talking is permissible on the three circuits simultaneously without any mutual interference.

In this connection it might be said, however, that for the successful operation of a phantom circuit the lines must be extremely well balanced. This is true not only as regards resistance, but likewise of inductance, capacity and leakage. This condition arises from the peculiar characteristic of an alternating current by virtue of which this current does not divide between two branches of a circuit in an inverse proportion to their resistance when the circuit contains capacity or inductance. An alternating current is propagated along the line by means of a wave motion, the amplitude and length of which wave depends upon the generating source, in this case the sound wave, and the reactions of the line. Consequently, since the talking currents are constantly changing in frequency, the period of vibration of a note of high pitch being very much greater than that of a low note, and since the capacity reactance decreases and the inductive reactance increases with an increase of frequency it stands to reason, since the strength of the current flowing in the line is measured by the quotient obtained by dividing the impressed E. M. F. by the apparent resistance of the line, namely,

$$\sqrt{R^2 + \left\{(2\pi fl)^2 - \left(\frac{1}{2\pi fc}\right)^2\right\}}$$

that in order to obtain a fairly equal division of current in the respective branches of the circuit, they must be as nearly uniform as possible so as to obtain a like amount of capacity, inductance, resistance and leakage in each branch.

In Fig. 39 we have shown a telephone circuit phantomed for duplex telephony. The desired result is obtained, in the circuit shown, by means of repeating coils, but it is undoubtedly obvious that the same end may be accomplished by the use of retardation coils as shown in the previous circuit. In duplex telephony the ground is used as a return conductor for the phantom circuit, and the phantom is therefore not as free from noise as the one shown in Fig. 38. The switchboard end of the circuit is inductively connected to the line by means of the repeating coil, and the phantom tap is taken from the middle point of the line winding of this coil. This winding consequently acts as a non-inductive resistance in the phantom circuit, as did the retardation coil in the circuit previously explained, and since the physical circuit makes full use of the magnetic qualities of the coil there will be no interference between the two circuits. The one objection to the repeating coil method is that these coils must be designed for transmitting ringing as well as talking current, and hence the efficiency of speech transmission is somewhat impaired by the insertion of these coils. In Fig. 40 is shown a circuit phantomed by means of repeating coils for multiplex telephony, the operation of which will be clear upon an inspection of the drawing.

In addition to using phantom circuits for furnishing the regular telephone service, they are sometimes used by toll operators as a two-way order circuit, in which case the passing of tickets and any other required exchange business can be handled over this circuit, leaving the physical circuits always free for regular service. This is quite an item, as the subscriber only pays for the time he is actually talking, and if the circuits are ordered up by means of the phantom, the physical circuits are only used for conversation which will pay the required revenue. A two-way order phantom circuit is shown in Fig. 41, and since the general arrangement of the phantom is similar to those already described we will only explain the special features which this circuit contains. It will be noted that the middle point of windings of repeating coils *A* and *A'* are wired to the lever contacts of keys *K* and *K'*. When key *K* is actuated, two

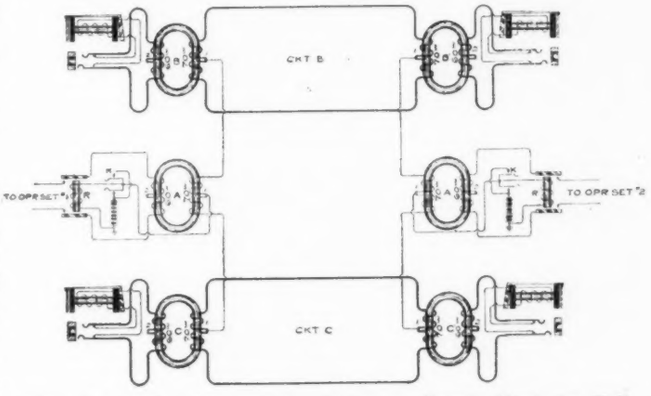


Fig. 41.—A Two-Way Order Phantom Circuit Used by Toll Operators for Various Business Purposes.

circuits will be established, one is from the ground, by way of relay *R* to the make contacts of key *K*, to battery. Thus relay *R* will be energized, and will consequently attract its armatures, which will place the operator's telephone set in direct circuit with winding 2 of repeating coil *A*. The second circuit closed by the operation of key *K* may be traced from battery to the contact spring of key *K*, and thence by means of the lever contacts of the key to the middle point of winding 1 of the repeating coil *A*. At this junction the current will divide, half of it flowing through the upper portion of coil 1 to the middle point of repeating coil *B*, and thence over the line wires of circuit *B* to the middle point of winding of repeating coil *B'*, from which point it may be traced to the middle point of winding 1 of coil *A'*. At this latter terminal the current reunites with the current which flowed through the lower half of winding 1 of repeating coil *A* and followed a path by way of telephone circuit *C*, similar to that outlined above for circuit *B*. The flow of current can now be traced to the lever contact of *K'* from which it may be followed by way of the break contacts of that key and relay *R'* to ground. Consequently relay *R'* will be energized and attract its armatures and thus this operator's telephone set (2) will be connected directly to winding 2 of repeater *A'*. Therefore, since these telephone circuits are connected to windings 2 of coils *A* and *A'*, and since the secondary windings are phantomed on the line circuits *B* and *C*, it follows that when the operator speaks into the transmitter of set 1 she will speak directly into the ear of operator 2, and vice versa. Thus the operators are in a conversing relation, in which they will remain until operator 1 restores key *K* to

normal, which will in turn de-energize relays R and R' and restore the apparatus to normal conditions. In case operator 2 desires to talk to operator 1 she can place herself in communication with this operator by the actuation of key K, when conditions will be established identical to those described for the operation of the circuit in the other direction.

Before leaving the subject of phantoms we wish to dwell briefly upon some of the precautions that should be taken in the operation of these circuits. As has been previously stated, the lines must be well balanced as regards capacity, inductance, leakage and resistance. For this reason it is advisable to keep the carbons on phantom lines scrupulously clean, since the accumulation of dust at this place is very likely to cause an unbalance which will be noticeable in the operation of the circuit. Then again, in order to obviate inductive disturbance, an extensive method of transposition must be resorted to. In the first place the individual wires of each physical circuit must be regularly transposed, and, secondly the two wires of the one physical circuit which compose one lead of the phantom must be transposed with the pair of the other physical circuit which constitutes the other conductor of the phantom.

If these provisions are not carefully observed in laying out such an arrangement of lines inductive disturbances are bound to show themselves with the resulting condemnation of the phantom principles. However, when the phantom is well balanced transmission over it is very often much superior to that obtained on the physical circuits due to the increase in the size of the line leads. Furthermore, this increase in the size of the leads may also be taken advantage of for Morse circuits by compositing the phantom circuit and thus further increasing the revenue obtainable from the capital invested in the line construction.

Telephonic Reminiscenses*

By C. E. McCluer

One of my telephonic experiences the recital of which may interest the general reader, was my connection with the earliest attempts to introduce some kind of a toll or measured service system. Like all telephonists of that period I had long noted and deprecated the almost universal tendency of the general public to exact personal service from the operating companies through the medium of the regular subscribers' telephones, gratis. This was rendered possible and almost universal through the mistaken policy of the subscribers in not only permitting the use of their telephones by non-subscribers, but in actually inviting and encouraging such use under the mistaken impression that they were thereby attracting custom and rendering their establishments popular. If they did thus secure added and profitable patronage it was at the expense of their interests in other directions, perhaps the loss of orders when intending customers were unable to communicate with them on account of their station being reported "busy" while an outsider was using it possibly for an extended conversation with his girl, or a lengthy flirtation with some other fellow's girl.

I tried to impress this view of the case on many of my subscribers whose telephones were more largely utilized by the insistent and ubiquitous non-subscriber, but in vain. Nearly all of them declared they could not and would not deny the use of their telephones to their friends and patrons under the requirement of the service contracts they had executed, and if we could not wink at the infraction of our rules we could take the telephones out. That we could not afford to do. Careful investigations which I caused to be made, showed that at least fifty per cent of the service rendered by our operators was for the benefit of people who did not pay a single cent therefor. Every other connection at least was made at the behest or for the benefit of a non-subscriber, and as illustrative of a peculiarly pronounced phase of human character and disposition, the very people who obtained their telephone facilities through the good natured generosity of their friends and neighbors were the most exacting patrons and critics of the service with whom I had to contend. I did not mind or seriously object to the occasional use of our telephones by non-subscribers who were driven thereto by stress of unusual and unavoidable circumstances, but I was decidedly opposed to their habitual use by people who were often just as well able to afford the expense of the convenience as their more independent and public spirited neighhbors who were frequently their competitors in business.

I therefore, for a long time, tried to stem or at least mitigate the volume of the increasing tide of illegal usage of the Southern Bell Company's exchange systems. But my efforts met with ill success. I appealed to our patrons to deny the use of their telephones to the plausible and insinuating non-subscriber when he sauntered in with the stereotyped, "May I use your 'phone for a moment?" or as was just as frequently the case, proceeded to help himself without leave and monopolized the station for half an hour or longer to the detriment of the proprietor's interests.

In the Eastern section of the city of Richmond was located a manufacturing establishment in which were employed a large number of operatives whose families formed a settlement of several thousand people contiguous to the factory. The only telephones in the immediate vicinity were those rented by the proprietors of the manufacturing concern, and for several years they were used by the entire neighborhood with the greatest freedom. A written communication to the firm calling attention to the clause in their contract requiring them to prohibit their telephones to non-subscribers brought a curt reply to the effect that if required to observe the contract to the letter, they would do without the service and I might send down at any time and have the telephones removed. I then made the proprietors a personal visit and orally argued the matter with them. They merely amplified their former response to my representations by suggesting that if we would open a toll station in the neighborhood through which their employees could secure service they would obey the requirements of their contract, but as long as their compliance would be tantamount to an entire denial of the telephone service to the people of the neighborhood they would rather dispense with the use of the convenience themselves.

This incident set me to thinking. The expedient of establishing toll stations in various sections of the city had been tried by my predecessors. Quite a number had been opened in drug and grocery stores in the outlying districts under contracts requiring the proprietors to act as the agents and collectors for the company, but the revenues derived from them did not pay the rentals of the telephones, and they were one by one abandoned. Hence I did not consider it expedient to meet the suggestion of our manufacturing customer by resorting to an abandoned experiment. I asked myself if there was not some way in which

*Continued from September (monthly) issue of Telephony.

the same purpose could be accomplished to better advantage. Then followed more expenditure of brain matter, more consumption of midnight oil and more loss of sleep, with the final birth of my "Automatic Toll Box and Connection Register."

The very first one of my toll boxes to be turned out of the local repair shop was put in commission in the manufacturing community where it was first suggested. Agreeable to his promise, the head of the manufactory put a stop to the use of the firm's telephones by their people and they were all directed to the toll station, with the result that for several years that station added from $10.00 to $15.00 monthly to the revenues of the telephone company, and that from people it had been serving for years without compensation. This experience emphasized my contention that fully one-half of the service we rendered the public was bestowed gratuitously. My device was therefore warmly welcomed by the officers of our company and it was not long before we had several hundred of them in successful and profitable use.

With the perfection of my toll-taking device I flattered myself that I had evolved a specific for all the ills to which the telephonic finances were heir. Here, thought I, was a scheme that would at once effect a complete and radical cure of the financial and moral maladies resulting from the fixed rental dispensation of telephone service, and satisfy both the operating companies and the patronizing public, enabling the one to secure recompense for all service rendered, and affording the other the satisfaction of knowing that they were paying for only what they actually received. I believed the device, when generally introduced, would correct the misconceived ideas of the subscriber as to his duty to his friends and customers, and remove the but too well grounded suspicion of the small dealer that he was helping to pay for the inordinate use of the system by the larger concerns, and at the same time would serve to help restore the self-respect and manhood of the sponging non-subscriber and enable him to assert his independence. According to my figuring, while the service rendered by the operators at the switchboard, and the expenses of operation and maintenance would be but slightly, if at all, increased, the revenues of the company would be largely enhanced and the margin between receipts and expenditures greatly widened, thus insuring increased dividends to the stockholders. That was another time that I dreamed dreams. And they were only dreams. *Chateaux en Espagne!* Literally Castles in Spain! Colloquially castles in the air! Of the air, airy!

While I was having a lot of Law system toll boxes turned out from the district repair shop, the subject of toll and measured service systems came rapidly to the front, and much correspondence resulted between telephone managers anent the subject. My toll taking device being the first in the field came in for a fair amount of notice and discussion and figured largely in some of the calculations. I became a strong advocate of the adoption of a toll system by the Southern Bell Company, believing as I did that an equitable toll system with rates scaled according to the average use of the telephones, was the only just and equitable way of dispensing telephone service. A simple "measured service" system, dependent on the records required to be kept by the operators, I did not believe could be successfully handled, and would produce constant and interminable friction between the companies and their patrons. I therefore naturally favored the adoption of an automatic toll taking device that would eliminate all central office records, and that would furnish a record which both parties to the transaction could accept without hesitation as just and equitable, and one that, like my device, could not be defrauded either with or without the aid and cooperation of the operators.

Records of connections were kept at quite a number of large exchanges within and without the territory of the Southern Bell Company and tabulated statements were made up thereon which showed as plainly as figures could do that the adoption of toll systems exclusively in place of the fixed rental systems, at rates ranging from one-half cent per connection for the large users to five cents per connection for the occasional users, would augment the revenues from fifty to one hundred per cent, without any material increase in either labor or expense. These further showed that under most conservative estimates and allowances for an average falling off in the connections ordered from the stations most largely utilized by the non-subscribing fiends, and a reasonable increase in patronage from people that were too independent and honorable to sponge on their more enterprising neighbors, the actual service required at the switchboards would scarcely exceed the normal fixed rental service, while the revenues would be largely increased, as before stated. These investigations and the resultant figures looked so tempting to our executive officers that they were on the point of authorizing the inauguration of an experimental universal toll system, when the untoward experience of the Bell people at some exchange in the Empire State, where they attempted to introduce a probably ill-advised and inadequately digested system, doubtless based on insufficent data, caused an indefinite postponement of the proposed action. I am not thoroughly familiar with the particulars of this unsuccessful first attempt to introduce a toll system, but I have been told that the failure of the scheme was largely if not wholly due to the determined opposition of the public. So clearly is a properly designed and regulated toll system conducive to the true interests of the majority of the subscribers and the public generally, I am sure there must have been a serious misapprehension of its advantages and a misconception of the results that would have flowed from it, in the minds of the people, or they would have welcomed instead of antagonizing it. Believing that the successful introduction of purely toll systems would have the effect of lessening the output of telephones, possibly the American Bell officials may have purposely misled the subscribers and secretly engineered the opposition that eventually defeated and indefinitely delayed the introduction of a successful system of the kind. I am sure I could have engineered such a scheme as I had in mind in Richmond, or any other of my larger exchanges without encountering serious opposition.

Thus perished another of my pet schemes that I firmly believe would have revolutionized the telephone exchange business and placed it on a firmer and more lucrative footing than it had ever occupied before or has ever occupied since. And the increase in revenue would have come, not from the regular subscribers whose telephone expenses would have been really reduced, but from the general public, the illegal users under the fixed rental system.

Briefly, my idea was to establish stations in residences, places of business and public institutions, equipped with automatic toll boxes, without other fixed charges than a reasonable installation fee. Metallic tokens designed especially for the operation of the toll boxes, were to be sold to all comers at prices scaled to the amount of the cash purchases; these tokens to be exchangeable and universally utilizable for payment for a three or five-minute talk from any toll station. I proposed to establish street boxes at important and convenient points, or wherever they would be convenient and useful to the general public, and invite the universal use of the exchange system by all classes of citizens at will. The tokens to be transferable from

hand to hand at five cents each, the wholesale purchasers being restricted to a maximum number of tokens per week at the lowest selling rate in order to guard against undue speculation. The exchange system thus being thrown open to the entire community for legitimate use, the total number of stations would doubtless have been somewhat reduced and the cost of maintenance lowered, while the cost of operation would probably have been but little affected. The possible reduction in the number of stations required in a purely toll system exchange evidently did not appeal to the American Bell managers, whose interests were centered in the largest possible output of telephones. *They* did not want toll systems any more than they did the common return telephone systems.

The adoption of a toll box like mine that could not be gerrymandered, and which required the observance of the livery stable maxim "pay before you ride," thus insuring a revenue from every usage of the telephones, would in my opinion have eventually brought about a sort of a telephonic millenium. And coupled with a good direct connection system it would have enabled the telephone exchange facilities to have been profitably extended to the many towns and villages that were fortunately left for the experimentation of the Independent promoter when he made his appearance on the scene of activity.

But I have forever abandoned the role of a prophet! In the Electrical Review of January 24, 1891, I made a prediction which has signally failed of realization. I wrote:

"The near approach of July, 1893, a month of paramount interest to the telephonic fraternity, is heralded by the advent of a numerous array of devices intended to provide for the easy and convenient substitution of telephone 'toll' systems for the 'fixed rental' systems now almost universally in vogue. As long as the telephone companies possess the rights conferred upon them by the operation of our domestic patent laws they are able to establish and maintain fixed rates for specified terms which are sufficiently lucrative to enable them to stand the imposition practiced upon them by non-subscribers; but on the expiration of the fundamental telephone patent granted to Professor Bell in 1876, it is highly probable that the rates now charged for telephone service will be materially reduced. As the margin between receipts and expenditures becomes narrowed by the reduction of rates, followed by increased patronage and the usual disproportionate increase in operating expenses, the illegal use of subscribers' telephones by non-subscribers will become a burden too grievous to be longer borne by the patient and long suffering telephonist, and resort will necessarily be had to some system more equitable in its operation than the fixed rental system. The toll system will then undoubtedly come to the front, and the telephone companies will very probably be compelled to adopt such a system in self-defense. * *

"Besides, a toll system is the only equitable method of dispensing telephone service. Under the fixed rental systems, 'A,' who really has but little use for his telephones, pays as heavily for his moderate service as does 'B,' whose telephones are utilized a hundred times a day. The telephone company, therefore, as the cost of the service is proportionate, not to the amounts charged 'A' and 'B' respectively, but to the amount of service rendered each of them, loses money on 'B's' subscription, which they must make up from 'A.' 'A,' therefore, besides paying a disproportionate rate for his moderate use of the telephone system, must also help pay for 'B's' immoderate use of his telephones. This unjust discrimination can only be remedied by the adoption of a toll system. * * * The use of automatic toll boxes also renders possible the introduction of pony exchange systems in towns and villages not large enough to support fixed rental exchanges, a few toll stations judiciously located serving the entire community and bringing in a larger revenue than could be derived from a small number of fixed rental subscribers, although as many fixed rental stations as might be demanded could readily be operated in connection with the toll stations."

The fear of checking the output of their station apparatus doubtless deterred the American Bell from embarking on the purely toll exchange enterprises, and when the Independents came into the field they were too inexperienced and too impecunious to try experiments, and felt safer to follow the paths blazed for them by the American Bell organizations. Hence my prediction failed of verification. But I still maintain that the purely toll system is the only equitable method of dispensing telephone service, and I still believe it will eventually supplant the fixed rental systems. It only waits the advent of the nervy pioneer.

How About the Calling Subscriber!

There is a man in the North End, says the Michigan State Gazette, whose resourcefulness is worthy of comment—not only that, but it is valuable also as a moralistic example. His name is Mr. Fellman; his telephone number is North 111. Kaufmann's Cleansing and Dye House responds to North 1111. We all know how often the careless person forgets the last "1" or gives the number so rapidly or indistinctly that the operator fails to catch it. Kaufmann's establishment is called dozens of times daily—therefore the multiplication of mistakes. It is safe to say that the result offers a splendid opportunity for Mr. Fellman to kick, but he doesn't kick, he smiles—not only smiles, but grows fat and prosperous looking on it, for Mr. Fellman is the kind of man that makes the ill wind blow soft and southerly and tempers it to his own profit. When his telephone rings he promptly answers, his face wreathes in smiles and his deep, rich, pleasant voice responds:

"Hello-o-o!"

"No-o-o, No-o-o, this is not Kaufmann's: this is Fellman's Shoe Store; when you are in need of anything in dainty, dressy footwear at a price that is right, call on me at No. 1524 Woodward Avenue. Yes-s-, Fellman's, yes-s-s—remember the name, two doors from the Boulevard. No-o-o-o, you want four ones—this is three ones—yes, three ones! No, not at all, not at all; it will be all right when you come in for that first pair of shoes. Good-bye, good-bye, madam—not at all!"

Every clerk in the store is trained to advertise the house in the same way, and with five errors in a day Mr. Fellman reaches 1,500 people a year with a personal interview. He refuses to have his number changed. "I wouldn't have it changed for anything!" he says.

The novelty of this method of advertising, it is needless to say, "grips the public," and undoubtedly brings this man, who uses his brains instead of the hammer, possibly enough business to pay for his telephone.

Good Condition of Independent Plants in Ohio.

Reports from Columbus, Ohio, state that the examination and appraisal of plants to be included in the merger, under lease, of the Columbus and United States properties, is making good progress. This work is in charge of Mr. B. H. Brooks, engineer of the Detroit Home Telephone Company. It is understood that the examination of the plants in Zanesville and Lancaster has already been completed, and the physical system in each of these towns found to be in excellent condition.

Practical Questions and Answers

Non-Inductive Winding on Line Relay.

Why is one of the two 500 ohm windings of a Stromberg-Carlson line relay wound non-inductively?

There are two reasons for placing the non-inductive winding on the line relay. First: When an operator plugs into a line jack, and operates the cut-off relay, there is a possible interruption to the flow of current over the line from the line relay, lasting until the battery connection is again supplied through the cord and the cord relays. This interval amounts to a very small period of time, but nevertheless appears as an interruption of the flow of current through the telephone producing a decided click in the subscriber's receiver. The greatest click comes from the breaking, rather than the making, of the circuit through the cord relay. The 500 ohm non-inductive winding reduces the amount of current supplied when the receiver is first taken off the hook and this tends to reduce the click in the receiver when the current is interrupted by the operator plugging into the jack. Fig. 1 shows the circuit.

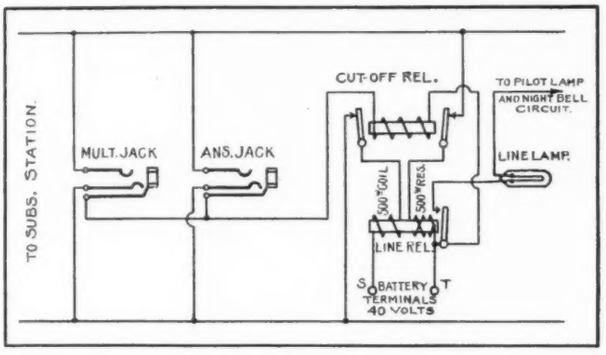


Fig. 1.

Second: About the time this line relay was designed it was the practice to use party line ringers on what was known as a four-party pulsating system. In this system two ringers of about 9000 ohms resistance were bridged from the sleeve, commonly known as the wet side of the line, to ground. This gave a leakage to earth through the line relay at all times under the normal condition of the line. This leakage of current tended to cut down the efficiency of the relay and also disturbed its adjustment. By reversing the relay windings and placing the non-inductive winding in the sleeve side of the line, the effect of the leakage was overcome and the relay could be adjusted for the best conditions.

Intermittent Trouble on Operator's Set.

We have some very bad trouble with one of our operator's telephone sets on a magneto switchboard. The set goes dead suddenly, so that the operator can not hear or talk. When we get to testing to find it, it comes back again as clear as a bell. It often comes and goes before we can get around to test for it. Is there any way to test for it so we can find the trouble without being deceived by its coming clear again?

If all troubles would remain steady, the troubles of a telephone repair or troubleman would vanish. It is the intermittent or "come-and-go" trouble that causes the worry. The only sure way to find any of them is close, physical inspection. You can not skip any hidden places. Begin at one end of the operator's secondary circuit, and inspect every connection through which the talking current must pass, and test every wire for continuity and insulation. Since the trouble cuts off both talking and hearing, it must be in the secondary circuit, so confine your efforts to that. Sometimes jarring the board will cause the trouble to appear. This is especially true in case of troubles caused by loose joints. The soldered joints are naturally the places most to be suspected, and each should be tested by pulling on the wire while using the set.

On some small boards the wires pass through holes drilled in the wooden cabinet at places, and are often stapled with ordinary metal staples for a considerable distance. Both these points must be examined with care, and pulled out and replaced with new wire if there is the slightest doubt as to continuity or insulation.

Faulty Ringer Construction.

A subscriber reported that his bell would hardly ring at all, although he could hear and talk all right. I supposed that there was a bad connection somewhere in the ringer circuit, or that he had a bad ringer. When the inspector went to the house and rang central, the bell rang perfectly. The call came in to the switchboard O. K., but when central rang him the bell only gave a few feeble taps. He got the same results on several trials. It was an ordinary 1000-ohm straight A. C. ringer and the line was working through 5000 ft. of No. 22 gage cable and 2720 ft. of open wire, No. 12 E. B. B. iron. We could find no loose connections in the circuit anywhere. We put in a new ringer, and it acted at first the same way. After a while the trouble ceased.

Later the instrument was removed. A few days ago I unwound the coils of the ringer and found what to me was a new departure in ringer construction. The inner ends of both coils, which had been bared for two or three inches, were wrapped around the cores, which were slightly oxidized. The other ends were connected to a 2½ in. flexible cord (stranded conductors) by merely twisting the ends together, leaving the joints without solder. I can now understand why such a ringer would balk, but I can not see why the new one should continue the trouble for a short time and then recover.

The condition of construction which you give is a bad one and very rarely found. "Uncertainty" is written all over it, which will account for the second ringer clearing its own trouble. Under the pressure of ringing current oxidation sometimes breaks down, and allows the re-establishment of a connection, and this is probably what happened to the second ringer. You will do well to keep clear of that make of bells until the construction is improved.

Connecting and Using Slide-Wire Bridge.

I have a complete outfit for a slide wire bridge for measuring resistance, but it has been some time since it has been used. I never used it and do not know how to connect it up or use it. I will give a description and diagram, which I think will explain fully what I have. You may answer how to use it.

The parts of your sketches showing the measuring instrument indicate that it is a tangent galvanometer. The scale around which the needle swings is marked to indicate the tangent of the angle from zero, instead of degrees. When the magnetic needle is placed in the center of the coils, and a current sent through the latter, the needle will move one way or the other. Set the galvanometer so that the needle at rest will be parallel to the

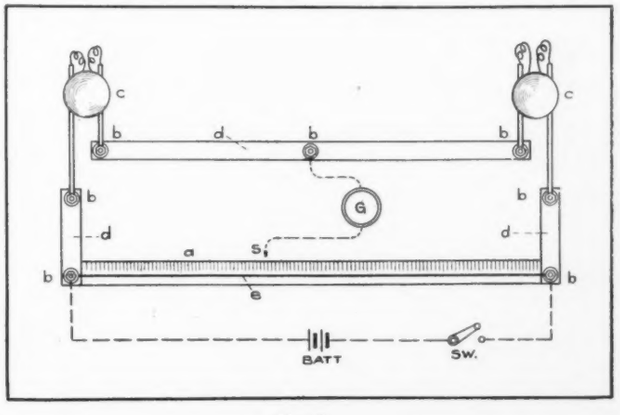


Fig. 2.

coil, i. e., set the coil north and south. There are four binding posts on the base. Doubtless two of them are for a winding of heavy wire, and the other two for a fine wire coil. For bridge work use the fine wire coil, as it is more sensitive. For the best work the tangent galvanometer is not suitable for the bridge, as it is not sufficiently sensitive.

The bridge is shown in Fig. 2 where "*a*" indicates a scale marked in centimeters, *e* a German silver wire, *b, b,* etc., are binding posts, *dd,* etc., are brass strips. Coils of small resistance, value unknown, are designated as *c* and c^1.

To use the bridge find out the resistance of c^1 with this known, remove *c* and put the unknown coil *X* in its place. Wire up battery, *Ba,* and a switch, *Sw,* as shown in broken lines, also the galvanometer. The latter should terminate in a stylus, *S,* which is nothing more than a convenient metallic tip which has a sharp edge which will not rust or corrode. Close the switch and tap the stylus on the slide wire, *a.* Find the point at which the needle gives no deflection by starting at the left end, and working toward the right. Then do the same by starting at the right and going to the left until you again get no deflection. If this gives two points, take the point half way between them as the true zero point. Let *f* be the number of scale divisions from the left end of the German silver wire to the zero point, and *r* the number of divisions from the right end to the zero point. Then

$$\frac{X}{c^1} = \frac{l}{r} \text{ from which } X = \frac{c^1 l}{r}$$

That is, multiply the resistance of the standard coil by the scale divisions to the left and divide the product by the scale divisions to the right.

To get the value of c^1 you can compare it with something of which you know the resistance. Or you can send it to us, with return postage and we will measure it for you.

Crossed Lines Due to Faulty Ground.

A firm has private lines, all grounded circuits, extending from town to all of its farms. A few days ago there was installed a new switchboard in place of an old board of the same make, and after it was installed all the lines were found to be crossed together, and they sent for me to fix it. I went down thinking they were crossed outside, but when I found that two of the lines ran in the opposite direction from the other two I knew that something must be wrong in the switchboard, but could find nothing. Accidentally I happened to take off the receiver from the C. & P. telephone and heard some parties talking on these private lines. By tracing the ground wire I discovered that the C. & P. telephone was grounded on the same rod as the private lines. I changed the connections to a gas pipe, which not only cleared the cross with the C. & P. but cleared all the private lines, and they have been working finely ever since. I can not see how grounding on the same rod would throw everything together and will thank you very much if you will explain it. It was bad enough to throw the drops.

The phenomenon which you describe is plainly due to poor

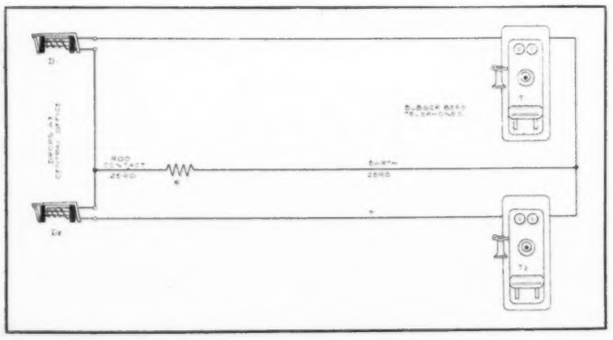


Fig. 3.

contact of the ground rod with the earth. It has been observed again and again in ground return work. In Fig. 3 let D_1 and T_1 represent the drop and telephone of one line, and D_2 and T_2 the same apparatus for another line. Both are grounded on the same rod at central. Let us say that the resistance between the rod and the ground is *R,* and that the rest of the ground is zero. Then the resistance, *R,* will occupy the position as sketched. Each telephone has its own circuit except the

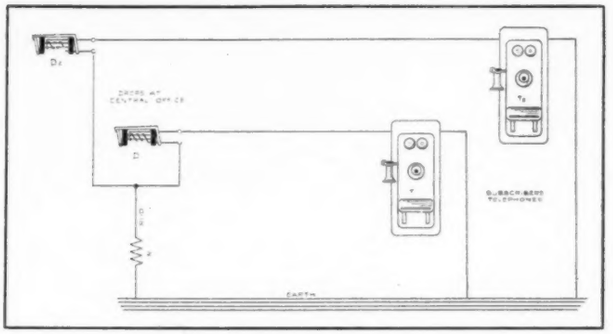


Fig. 4.

ground and the resistance, *R,* which are common. Simplifying it still further we have Fig. 4. Now imagine current starting from T_1 and going to the drop, D_1, at central. It will tend to travel through a complete circuit to its starting point in T_1. When it comes to the ground rod it will divide, part going directly through the resistance, *R,* into the earth. The other part will go through the other line drop, D_2, and its telephone T_2, and unite with the ground rod current in returning to the telephone, T_1. In this way the cross-talk and cross-ringing take place. Of course it takes a much worse case to make cross-ringing than cross-talk, since the bells are not as sensitive as the receiver. Your rod must have been nearly dry.

Proper Sag in Copper Wire.

What sag should be left in a No. 4 Weatherproof copper wire on poles 100 to 120 ft. apart? There will be only two wires on the poles.

The sag should be not less than 7 ins, while 8 is better. No. 4 weatherproof copper, triple braid, will run about 160 lbs. per 1,000 ft. It will average about 1,114 lbs breaking weight. Taking a factor of safety of three, the safe tension on the wire will be 371 lbs. On this basis the above estimate was made. If the wire is put up in summer, it ought to have more nearly 10 ins., as it will tighten with the cold.

Ringing Trouble on Rural Line.

We have on one of our lines a telephone which will ring the telephones on the line, but will not throw the drop on the switchboard. It worked all right until about four months ago. The generator has never been taken apart. All the other telephones on the line can get central. What do you think is the matter with the generator?

It is well known that generators will weaken with age and use. Hard ringing on a short circuited line also tends to demagnetize the steel magnets, thereby weakening the generator. It may be that some time when the line was short circuited the user of that particular telephone turned the crank very vigorously in his attempts to ring. Although weakened, it may still ring the bells and not throw the drop, a not unusual experience. The fact that the bells are nearer to the telephone than is the central office contributes to this effect.

Once in a while a manufacturer is too liberal in the use of oil on the generator bearings. This oil eventually works its way into the wire of the armature winding, dust collects, and the insulation between many or all of the turns becomes greatly lowered. In your case the oil may affect only enough turns to weaken the machine to the extent you describe.

A little stiffness in the drop may likewise help produce the effect you mention if that generator is fundamentally the weakest on the line. As long as the drop works with

perfect freedom, the weakest generator will throw it as certainly as the strongest. But when the drop loses its sensitiveness, the weakest generator will be the first to fail to throw it, though its ability to ring the bells will be unimpaired.

Try cutting the line over to a drop known to be good in every way, and make a thorough test by ringing in. If this fails, examine the generator for the faults described above.

English and American Binding Posts.

Is there any real advantage in one form of binding post over the other? I refer to the American and English binding posts. With the English post, is there any certain way to wrap the wire around the post?

To make the matter clear the two types of binding post have been reproduced in Fig. 5. The American binding post consists of a solid post with a hole drilled at right angles to its axis for receiving the wire, which is clamped by a screw with a milled head. The English type consists of a threaded post carrying a milled or hexagonal nut. The wire is bent around the post, and clamped between the nut, or washer, and the base. Neither form is the best, for each has its particular use. The American type is best for wires or terminal tips which very nearly fit the hole. If small copper wires are clamped, they are likely to be cut in two, or greatly weakened by the clamping screw. The wire or tip should be large enough, or hard enough, not to be readily nicked by the screw. This type has the disadvantage that the screw will occasionally work loose.

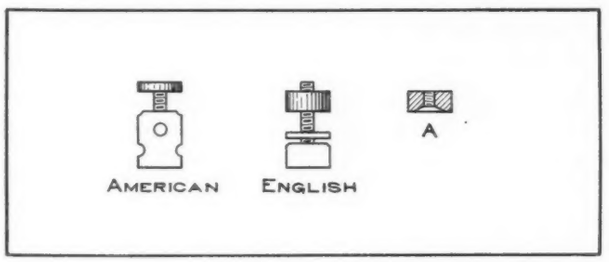


Fig. 5.

The English type of post is better adapted for use with small or soft wires, as the pressure is applied all the way around the nut. Also, the resistance of the joint is somewhat lower on account of the greater area of contact. Some people have made the nut as shown in *A* in Fig. 5, and omitted the washer. Dry cells have been very largely thus equipped. The objection to this form is that the sharp edge, made by "dishing" the under side so deeply, will tend to cut the wire where it leaves the post. It is better to use a flat washer, and have the lower end of the screw-hole reamed out only enough to allow the nut to catch the threads easily. For most telephone purposes, the English type of post is to be preferred.

In attaching the wire to the English post the free end should be carried around "clockwise," so that, in tightening the nut, the tendency will be to wrap the wire more closely.

Measuring Short Circuit on Bridged Metallic Party Line.

I am contemplating buying a Pignolet 3-reading volt-ammeter, 100 ohm coil, and 6.5 volt range or higher. I would like to know how to use it to measure the location of a short circuit on a seven-mile metallic circuit, No. 12 gage iron B. B. wire, with 13 instruments, all bells bridged. All generators are cut in manually by a push button projecting outside of the box, except some which are connected as the crank turns about one-fourth round in generating. I want to test out from the jack at the switchboard. How should I proceed, step by step, to locate a short circuit, say three-quarters out on the 7-mile circuit? Also to locate a ground on either side of the circuit?

The location of short circuits and grounds on bridged party lines is not an easy matter, since each telephone forms a leak across the line which will lower the measured resistance below that of the two wires out to the fault. By noticing the relation between resistance measured on the short circuited line and the place where the troubleman finds the fault you can often estimate with tolerable accuracy the probable distance in other cases which occur later. But the following method is more logical:

When the line is known to be in good condition have a "dead short circuit" put on the line at the remote end. Measure the line in this condition, and record the value. Have the short circuit taken off and put on again three-quarters of the way out, or at some convenient corner, measuring and recording the resistance again. Do this for as many points as you think desirable, though three will usually be ample. If the line swings together in the future, you can measure it and refer to your recorded resistance to get an idea of its location. In doing this it must be remembered that when iron wire gets crossed, the resistance between the two wires is rarely zero, and this will make the cross appear farther out than it really is. To get an idea of the difference it will make, have the lineman cross up two of the wires of a circuit at the point where you have just made the dead short test. Measure the resistance, and compare with that of the dead short circuit.

The instructions which come with the Pignolet instrument use the following method of figuring for resistance. The scale division is a tenth of a volt on the 6.5 volt scale, and, as the resistance is 100 ohms, each scale division means that one milliampere (.001 ampere) is flowing through it. Knowing the voltage of the battery used, it is easy to calculate the unknown resistance by Ohm's law, $R = \frac{E}{I}$. That is, divide the voltage of the battery by the current to get the total resistance. From this subtract the resistance of the voltmeter, leaving the true resistance of the line. It is more accurate to use that coil of the voltmeter, the resistance of which is near to that of the line than one which is too small. This is to bring the deflection of the pointer well up on the scale, where the reading will be most accurate.

Pole Changer for Pulsating Current.

Will you please publish the diagram by which the Warner Electric Co. wires up its pole changer, providing for both positive and negative pulsating as well as alternating current; also give whatever explanation you think necessary?

The circuit is shown in Fig. 6. The vibrator carries two extra contact points, 5 and 6. The former, 5, is attached to the positive battery terminal and the latter, 6, to the negative terminal. The regular contacts, 7 and 8, carry positive and negative battery as usual. For alternating current, the

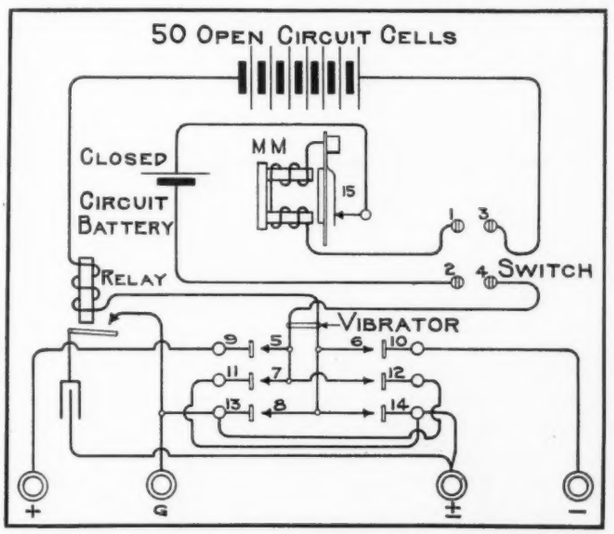


Fig. 6.

ringing keys are connected to posts *G* and *I*. The path of the ringing current will be as follows: When the vibrator is at the left, battery will flow from the positive terminal of the fifty open circuit cells through 3 and 4 of the switch to contact 7 of the vibrator, thronugh spring 11 to post *I*, to the ringing key over the subscriber's line and through the bell to be rung, back through post *G* to spring 13, contact 8, winding of the relay and to negative battery. When the vibrator swings to the right, contact 7 touches spring 12 and connects positive battery to the *G* binding post, etc., to line, returning through the *I* post, spring 14, to contact 8, relay winding and so to negative battery. This is a plain reversal of the battery. The flow of current through the relay pulls it up, connecting the condenser across the line.

To get positive pulsating current for a 4-party selective line with biased bells, connect the binding post *G* permanently to ground. Then the post marked + will furnish current as follows: from positive battery through 3 and 4 of the switch, contact 5, spring 9, post +, line and bell, ground, post *G*, spring 13, contact 8, relay winding to negative battery. On the swing to the right the spring 9 is open, so that no current will flow. In the same way the — post will furnish negative current by drawing it from spring 10 and contact 6, the *G* post furnishing the ground connection as before.

The condenser is for the purpose of smoothing off the corners of the wave, so that the current will not rise so sharply in the line, nor fall so abruptly. Thus it reduces noise on adjacent lines and in the switchboard circuits while ringing. It also makes the spark at the contact less. As wired the condenser is across the circuit in all three cases, ringing straight alternating, positive pulsating, and negative pulsating. But it is only in the first case that the condenser is left across the line during the interval between taps. Thus in pulsating ringing the condenser is present during growth of current but taken off with the battery.

The circuit of the closed circuit battery is very simple. The single cell furnishes current through 1 and 2 of the switch to the motor magnet, *MM*, which by its make-and-break piece, 15, keeps the vibrator in motion.

TO WIRE CHIEFS AND MAINTENANCE MEN.

Clearing of troubles which occur in your exchange, inside or outside, may be made the subject of short, practical letters which will interest other telephone men. These TELEPHONY *will gladly publish, if illustrated by diagrams or photographs. Simply write a description of the nature of the trouble, tests and location, cause found, and method of repair. Payment will be made for all letters published.*

A TELEPHONE ENGINEER'S DREAM.

By J. D. ARCHER.

The sight of those amused glances caused the combative side of the engineer's nature to assert itself, so that it required but a moment for him to determine upon the course he would pursue.

He reached up and laid hold upon the huge tray and dragged it down to the bench beside him with an accompanying clatter of dishes and splash of liquids that brought the females to their feet with screams of surprised terror, while the guard sprang up and came striding toward him, evidently bent on placing the tray upon the table where it belonged. The Worldian, however, was not in a habit of starting things and then leaving them to be finished by someone else. He grasped the large dagger-like knife in one hand and the wicked looking three-pronged fork in the other, and sliding down from the table, stood awaiting the attack.

As the guard approached the engineer raised the huge fork high above his head as though to hurl it squarely at the face of the oncoming cyclop.

The guard came on with his small shield before him as a protection whereat the engineer flung the harpoon-like fork with such force that it struck the clumsy headgear of the giant and tore it completely off. This somewhat disconcerted the latter for a moment and the engineer, seeing his advantage, drew up the broad bladed knife as though to hurl it after the fork.

Possibly the guard had never before looked into the battle-lighted eyes of a warrior of the Worldian type, or, it may have been that the story of "Jack, the Giant Killer" had been translated into his language, and thus had fallen under his observation for he turned quickly about and started for the doorway. The engineer followed him, the threatening knife still poised above his head.

The tawny form disappeared through the doorway, upon which Bemis turned about and went back to his seat beside the tray. Once there, he immediately fell to carving the roast with the knife and was soon busily engaged in devouring his first square meal in Cyclopia.

His meal finished, the engineer retired to a leather divan, and was soon fast asleep.

How long he slept he never knew, but he was at length aroused from his slumbers by a rough shaking of his shoulder, and opened his eyes to behold a giant bending over him, grinning down upon him in good humored friendliness.

The engineer sat up and rubbed his eyes vigorously, whereupon the youth handed him a note, which he immediately opened and read. This note was from the Queen's maid, requesting that he come to her straight way, and stated that the youth could be trusted to show him the way thither.

Bemis arose and motioned the boy, who though very young, was fully as large as himself, to lead the way, and together they wended through long winding corridors to the Queen's reception room.

Here Miss Birdling was awaiting their coming, and her greeting was quite informal and friendly.

"It seems so good to have you here, Mr. Bemis, and to be able to talk to one's own countryman, and I find it a great relief, a quite agreeable break in the monotony of things generally. I feel sure that you will like it here though when you have once become accustomed to the ways and means of the people."

"Yes, I trust so, when I have once become acclimated, as it were, but this present state of the uncertainty of things is fully equal to a most aggravated case of seasickness. To be or not to be, that is the question. Whether it is the correct thing for a warm-blooded American citizen to endure the impudence and bald-faced ignorance of these grinning, heartless heathens, or to take up arms against the whole uncivilized, one-eyed race, and annihilate them."

"You have the tongue of an English Parliamentarian, Mr. Bemis; but I fear the latter alternative would be more easily advocated than performed. But, granting that you were able to annihilate them—what then?" laughed the maid.

"What then! You and I and the Garden of Eden all over again, and the hope of a greater and nobler Mars," replied Bemis with a careless wave of the hands.

"Now, you take the matter coolly enough, truly, Mr. Bemis, but we must now get about the matter of your learning."

"True. I am quite as anxious as any schoolboy regarding the mastery of the language of these most wonderful people, for I mean to have become a knight of the King's Court in less time than a sixmonth."

"Very well, but go about it carefully. You know the penalty for failure—death,—and one of their favorite methods here is to hurl the victim from a mighty catapault against a stone wall in the great public court."

The maid then arose and calling the youth who had remained

*Concluded from September issue of Telephony.

silently at the entrance, gave him some instructions to which he nodded ready compliance.

"I have instructed him to show you a place to eat and sleep, and then return here with you, upon which we will begin the lessons. You see, your life and liberty are in my keeping until you have become a naturalized Cyclopian."

"Until I get my two eyes knocked into one, you mean," laughed Bemis.

One of the remarkable qualities of the dream is, in a general way, is its proneness to pass quietly and imperceptibly over those portions of its theme which are dull and uneventful and to revel only in those phases that are animated and fraught with danger and excitement.

As a natural result of this peculiarity the mind of the sleeping inventor made a quiet but instantaneous transition to the end of the month of time alloted for the completion of the instruments that were to revolutionize the government of Mars.

True to promise, the wireless mechanism had been completed, and in the presence and with the help of Miss Birdling, the inventor had performed tests that were most satisfactory.

He had, during the past month won the confidence and friendship of the bright Cyclopian youth, Moderadorites, who had become an interested and eager satellite, and who through his quick powers of perception, was very useful to the inventor.

The morning dawned at length when the new instruments were to be tried in the presence of the king, and as the fact that something new and wonderful was about to be performed by the little dwarf from a distant sphere had become noised widely about the kingdom, every native of the land, male and female, who had any possible way of gaining admission to the Royal Chamber was present and impatient to learn what was being done.

As the inventor paused at the entrance to the chamber, his eyes were greeted by a scene such as is not quickly forgotten.

The great chamber, itself a triumph of the superb in architecture, was transformed by the sunlight that scintillated through the wonderfully wrought windows and fell in softened and weird splendor upon jeweled wall and cloak and diadem. Magopolites, the king, seated upon his magnificent throne, seemed even larger and more imposing than before. Beside him, gowned in clinging cloth of gold; her hair, ears, arms and throat adorned with gleaming gems, reposed the Queen, while at her feet sat the maid languidly swaying a beautiful palm. Immediately about her were seated several of the foremost women of the kingdom, and back of them all and almost surrounding them was a group of stalwart armed knights of the King's Guard.

The throne was peculiar in construction in that from the outer railing at the top of it, the descending sides down to the bottom, seats were arranged. Today these seats were occupied by the Courtfolk, the strange peculiar blending of their garments making no mean setting for an already remarkable picture.

The inventor, closely followed by Moderadorites, who seemed to thoroughly enjoy the distinction of being the right-hand bower of the wonderful double-eyed dwarf of an unknown world, and bearing the precious pieces of mechanism, stepped forth into the chamber.

The remarkable strides which the engineer had made in the mastering of the Cyclopian tongue would at this time prove its inestimable value.

"Hail, Great Magopolites, the talking instrument is at last completed, and in the time allotted, and tomorrow you can safely begin the conquest for the supremacy of Mars."

"So thou sayest, but the proof, man, the proof, that remains to be seen."

"Proof you shall have, O King," using the Cyclopian style of address. He then handed one of the instruments to Moderadorites, who stepped quickly to the King's side and placed it in the latter's hands. Bemis thereupon went hurriedly down the chamber to the entrance. Once here he pressed the button, the bulbs already having been exposed.

The bell on the instrument which the King held rang loudly. The latter was a trifle awed at this unexpected sound, and eyed the instrument curiously.

Bemis next made some motions to the youth, who immediately assisted the monarch in placing the transmitter in the proper position and held the receiver to his right ear.

Again the engineer pressed the button and the bell on the instrument which the king held rang lustily, so lustily, in fact, that the monarch involuntarily loosened his hold of the instrument, and had it not been for the watchfulness of Moderadorites, who caught it just as he saw the giant's grasp loosened, the instrument would have gone rolling down to the foot of the throne.

A murmur of excited interest ran through the impatient audience.

Moderadorites once more adjusted the mechanism and replaced it in the king's hands, at the same time explaining that the ringing of the bell was merely a signal by which the engineer wished to get his attention before beginning to talk.

Seeing that the instrument was again in position Bemis spoke into his transmitter.

"Good King, I would speak with you one moment."

Upon this the king's face took on an expression of vexation and he made three quick backward motions past his ear as though motioning some one away.

"Away, Verrissimus, away. This is no time for your pettishness. Tell your troubles this evening when we are alone. Away, I tell you, or I can hear nothing."

Then in a loud voice he called:

"Speak up, Dwarf, I can hear nothing. Speak up. My time is precious."

Bemis, who was almost out of hearing of the voice, thought the king merely could not understand clearly, and he therefore repeated his first statement in a louder voice.

Again the king took the receiver from his ear and repeated the backward motions with still greater emphasis.

"Verrissimus, desist. You are a veritable type of the female. You must hear and be heard, even though the fate of a kingdom hinges upon your silence. Desist, I command you."

The youth took the instrument which the king gladly relinquished and spoke to Bemis through it.

"The king hears, but he mistakes your voice for that of his wife, Verissimus. I will explain to him."

Thereupon he explained to the monarch his mistake and the latter finally took up the instrument again and with a look of doubting defiance in the direction of his spouse, who was regarding him with a puzzled expression in her eyes, spoke into his transmitter.

"Was that your voice, Dwarf? The tones were so soft and womanlike, I thought my wife made a request."

It was now the engineer's turn to be puzzled.

He could see plainly that the king was talking, but the tones transmitted were unintelligible to him. There was a roaring sound in the receiver, but the tones were apparently too powerful to register. He could hear quite distinctly, but he could not talk, the projected tone vibrations being too intense and forceful to make any impression upon the delicate mechanism of the apparatus.

This fact he must break to the king, and it was necessary to do it in a most delicate manner, or the chances of knighthood would all end at the catapault and the stone wall, should this semi-barbarian but become suspicious of anything that savored of conspiracy.

The engineer pretended to be adjusting the mechanism while he thought busily. Then an idea occurred to him that offered a possible means of pacification. The proposal having been made, one after another of the king's trusted stalwarts came forward and wrestled with the instrument, but without avail.

The king had grown impatient and angry, and he now arose and drew himself to his full height, glowered down upon the luckless inventor, upon which a silence fell upon that wonderful assemblage that was oppressive, almost painful.

Not a man, woman or child in all Cyclopia but knew of the giant's terrible temper when once he was aroused, and it was now apparent that his anger was at almost white heat.

After a moment he pointed a long forefinger at Bemis and said slowly:

"Dwarf, you have lied. You shall die."

The guards roughly fell upon the engineer and he felt himself being dragged toward the doorway.

He was dragged roughly from the chamber and down the stone steps of the palace and on into the wide royal court. Here they bound him to a tall white post. Then they brought great bundles of fagots and piled them about his feet. This they set on fire. He could hear the crackling of the flames growing louder and louder and smell the fumes as they rose about him.

Suddenly a mighty roaring of voices smote upon his ears, which he surmised to be the angry cry of the throng of barbarians now gone wild with delight at the anticipated torture of their victim.

He gave one powerful, superhuman tug at the thongs which bound him and—

"Wake up, Bemis; wake up, you lubber. Your clothes are on fire."

The chief engineer stood beside him as he awoke and stared blankly about him. The chief had dragged him from his chair and had just succeeded in smothering the flames that were enveloping his shirt-front. The one o'clock whistle in the factory was blowing lustily and the machinery was humming musically, which probably accounted for the noise of the roaring multitude.

"Better put out your lights before you turn in after this or your wife will get your life insurance," remarked the chief dryly.

"I though she had it already," muttered Bemis, as he gathered himself up and put on his working apron.

Engineers at Work on Ohio Plants to be Combined Under Lease.

In connection with the leasing of three big Independent telephone companies in Ohio to a holding company, experts have been employed to make a careful study of the properties and conditions in order to ascertain as nearly as possible what will be the needs within the next twenty years.

It is believed that the business of these companies has passed the period of indefinitely rapid development which forms a part of the experience of all Independent companies, and has arrived at a point where the past may be used as a basis for estimating with fair accuracy the development in the future. By taking careful note of the increase in population in the cities where the companies are located, the character of the increase, the rate of development of the telephone business in the past, growth of general business and other features of this kind, a pretty accurate idea of what will be demanded during the next five, ten, fifteen and twenty-year periods may be had. By securing this estimate the companies themselves, and the larger leasing company, may know what amount of business may be expected, and prepare for it accordingly. The long-distance business is different in character from the local business, but it is believed that just as accurate an estimate may be made of what must be done in the future as in the case of local companies.

After placing the three largest companies of the state under one management, it is believed that a beneficial reduction in operating expenses will result. It is also thought that it will be possible to take advantage of improvements that will result in saving more readily than where the companies are operating alone. Telephone men believe that the near future will bring about greater improvements in the way of ecomony in operation than the past has ever seen. This will come through the development of standard systems of operation and accounting, and the invention of apparatus of various kinds.

It has been asked, if such results as these are expected, why all the large companies in the state, Toledo, Dayton, Youngstown, Akron and others, were not taken into the plan. The answer is that the company must not be unwieldly at the beginning. Only those that could be taken in logically, and operated with the greatest economy, giving the best service, were included. The way has been paved for the admission of others if it is found advisable to do so. The connections between the Cuyahoga Telephone Company of Cleveland, and the United States Telephone Company, with headquarters in the same city, are very close. They could be operated together without trouble. Columbus telephone men were greatly interested in the formation of the plan and will subscribe liberally to the stock of the holding company. They have always worked in harmony with the United States, and wished to fortify themselves against any possibility of ever being disturbed by competing companies. It was logical, then, that the Columbus Citizens' Telephone Company should take a leading part in the plan. While others were in hearty sympathy with all these companies and would have been as loyal as any, the same conditions did not exist in respect to them. What the future may bring is a question to be decided.

That the new arrangement will increase the faith of financial men and institutions in the Ohio Independent telephone movement goes without saying. They now see an allegiance that will last through future years, and a plan that solidifies the companies into a whole for operating purposes. There is no danger now that stocks of local companies will be reduced in value by losing their long-distance connections and, on the other hand, the long-distance lines will always have the local connections for originating business. The stock of the leasing company will go into the hands of local telephone men over the state and this will acquaint local bankers and financial men with the situation and strengthen their confidence in the business. In short, it will make it much easier to finance any legitimate proposition in connection with the telephone business than it has ever been in the pant.

James B. Hoge, well known for the leading part he has long taken in state and national Independent telephone development, has expressed the belief that the movement to effect useful combinations of interest will extend all over the territory covered by the Independent movement. Furthermore, he believes that it should grow. Mr. Hoge said that the same plan could be adopted in practically all the states, with such changes as are necessary to meet the state situations. These would not be so great as to prevent the companies of the different states from co-operating and working together, as one large system. The plans would be in the hands of the officers of these companies, and the operation would be thus simplified. It would be easier to adopt policies for the entire territory than it has been in the past, and would put the business on a still stronger basis, both operative and financial, than it now occupies.

No information has been made public as yet regarding the officers of the new company or the management. It is said that the individual companies will be operated under their own names. Attorneys are now working out the details of the lease. The headquarters will be either in Cleveland or Columbus, but this will be decided with other matters that have not yet been gotten out of the way.

Telephone Law

Conducted by A. H. McMillan

Franchise or License, What?

When our company was first organized, we were given a franchise by the city council in a very simple and concise form, the only privilege being to use the streets, alleys and public places of the city for the construction, operation and maintenance of a telephone line, and the only obligation being to allow the city to use our poles for city purposes. The franchise was really not necessary, as the state law gives the same right. The city has always used our poles for its fire alarm system, and, besides, we have given them two telephones free. A short time ago, the council repealed our franchise, thinking that we were not acting under it, but under another one granted about the same time. We did not know about their repeal at the time it happened, or we would have had the repeal set aside. Now, we are in some little difficulty with the street commissioner over the moving of poles to accommodate a new pavement, and the city authorities claim that we haven't any franchise, the city attorney saying that our franchise was merely a license, or designation of the streets which have now been repealed.

Please give us your views on the subject.

Where the state law gives the telephone company a right to use the streets and highways of the state for the purpose of conducting a telephone business by the maintenance and operation of poles and wires, a local franchise is unnecessary, and all that can be required of the common council is to designate the streets and alleys to be occupied by the company. However, such a designation, after it has been acted upon by the company by expenditure of money and erection of a line, and particularly where the company has given the city free telephones, and the use of its poles for city purposes in return for the designation, amounts to a binding contract, and the common council cannot validly repeal the ordinance making such designation. It is therefore the opinion of the legal editor that you can hold the city to the designation of streets made in the ordinance, the repeal of which the council has unwittingly tried to effect. Missouri River Telephone Company v. Mitchell, 116 N. W. 67.

Consent of Local Authorities Irrevocable in South Dakota.

In South Dakota, the provisions of the constitution and statutes are to the effect that the owners of telephone lines operated in the state have the right of way over lands and real property belonging to the state, and the right to use public grounds, streets, alleys and highways in the state, subject to control of proper municipal authorities, as to what grounds, streets, alleys and highways shall be used, but no telephone line shall be constructed within the limits of the city without the consent of its local authorities. Revised Civil Code, Sec. 564. Cons. Art. 10, Sec. 3.

The Missouri River Telephone Company obtained permission from the city of Mitchell to erect and operate a long distance line within the city. Relying upon the permission, the company began constructing a line from Armour to Mitchell, a distance of about forty-five miles. This line was constructed in the city along a route designated by the committee. In May, 1905, the city passed another ordinance, purporting to repeal the former one and authorizing the street and alley committee to remove the company's poles. Upon receiving notice of this proposed action, the telephone company brought suit for injunction to restrain the city from interfering with its poles. Judgment was given for the telephone company in the circuit court, and this was affirmed by the supreme court of the state.

The court held that the consent of the city having been once given, it could not be revoked, and therefore the company was subject only to such rules and regulations as the legislature might prescribe or authorize the council to prescribe.

In discussing the law, the court said: "And it is fortunate that such is the law; the construction, operation and management of telephone lines, especially long distance lines, being matters in which all the inhabitants of the state have a constantly increasing interest." Missouri River Telephone Company vs. City of Mitchell. 116 N. W. 167.

Burden of Proof in Proceedings Before Railway Commission

The State Railway Commission of Nebraska, at a hearing on August 29, 1908, rules that the burden of proof in a proceeding to prevent a telephone company from increasing the rates was upon the remonstrators instead of the company. This means that those who object to the raise must prove that the raise is unnecessary rather than that the company should prove it desirable.

This ruling was made in a hearing to prevent the Phelps County Telephone Company from raising its rates for residence telephones from $1.25 a month to $1.50; on business telephones from $2 to $2.50, and the party lines from $1 to $1.25. The company alleged that it had never paid a dividend, and could not keep up the efficiency of its plant at the present rate of charge for service. The remonstrators disputed the justness of the company's expense account. The commission took the case under advisement..

Duty of Company Maintaining a Telephone Line in Its Factory.

The duty of a corporation, which owns and operates, in connection with its factory, a private telephone and signal system, is the same in respect to its employees as that of a company exclusively engaged in the telephone business. This was held to be so by the circuit court of the United States for the Western district of Tennessee in a case brought against a company which owned and operated a cotton factory. The employee injured was not a lineman, and had never worked for a telephone company. He had climbed a ladder, set against the pole, up to the cross arm, where he loosened one of the wires and threw it to an assistant below, telling the latter to pull. The man on the ground did so, and the pole fell, severely injuring the employee upon the ladder. Upon examination it was discovered that the pole was affected with dry rot. The court held that the company was bound to keep the poles in a reasonably safe condition, so as not to be dangerous to employees required to ascend them to repair the wires. The question of whether the employee should have known that the pole was rotten was held to be for the jury. Jackson Company, vs. Meadows, 159 Fed., 110.

Installation of Slot Machine Telephones Forbidden in Oklahoma City.

Providing a fine of $100 and jail sentence of not more than 30 days for violators, the ordinance to govern the conduct of telephone business in Oklahoma City, passed by the city council recently, declares: That no slot machine telephones shall be installed unless the subscriber makes a request; that new telephones must be installed within a limited time after application is made, provided wires are within a certain distance of where the telephone is desired; that there shall be no discrimination between patrons, and that all patrons and their customers shall have the free and unlimited use of the telephone; that there shall be no raise in rates during the life of a written contract specifying a rate, even though a company gains enough telephones to justify an increase under its franchise rights. The passage of the ordinance was bitterly opposed and was secured only after a hard fight.

Telephone Finances

Keystone Investment Strength.

The well fortified position of the bonds of the Keystone Telephone Company of Philadelphia, is indicated by an examination of the present condition of the property with respect to earnings, plant investment, bonds outstanding and balance available after the payment of the interest on bonds which constitutes a fixed charge against the investment. At the present time, the Keystone and its subsidiaries have outstanding, in the hands of the public, the following bonds:

Keystone Telephone Company, 5% $4,485,000
Eastern Telephone & Telegraph Company, 5%....$250,000
Collateral Trust Notes, 6%.....$600,000

The annual report for the year ending June 30th, 1908, just issued, shows an item of $251,000, 6%, collateral trust bonds. These bonds were issued to purchase the stock of the Eastern Telephone and Telegraph Company, and are being paid out for earnings, and so do not properly constitute a permanent fixed charge against the property, owing to the method adopted for taking care of them. Consequently, while the interest charges shown in the annual report amount to $313,112.48, there are sound reasons for considering the figure of $272,000, the interest on the bonds enumerated in the table above given, as the proper figures to consider in estimating the permanent fixed charges against the earnings.

Figures from the report just issued show that, on June 30, 1908, the revenue producing plant included 28,455 telephones, and 335 miles of toll line, carrying over 3,000 circuit-mile of wire. Allowing for a reasonable growth since that time, the bond issue and interest charges per station and per mile of toll line, will now approximate respectively $17 and $9, and this amount covers expensive city construction.

Careful management has enabled the company to bring its ratio of operating and maintenance charges down to 51.3% of gross earnings, which, for the fiscal year just closed, totaled $1,051,071.56. Figures furnished by Mr. C. E. Wilson, general manager of the company, show that the average income per station for the past year was $37.89, and the expense to operate, $18.05, leaving available for interest charges, reserve and surplus, $19.35 per station. This is surely an ample sum to cover renewal reserves, and provide the company a means for still further strengthening the position of its bonds which are now so firmly based on a substantial property, possessing ample earning power.

As a matter of fact, had the officers chosen to adopt any other than the conservative policy in the matter of provision for renewals which they put in force some years ago, and which has resulted in the building up of a reserve fund to provide for this contingency amounting to over $367,000 on June 30 last, it could this year have made a dividend payment at the rate of 6% on its $1,936,000 preferred stock outstanding, and 2½% on the $5,000,000 common. However, the directors of the company have elected to create a substantial reserve before paying dividends, and, for that purpose, $100,000 per year is being set aside.

Up to the present time the company has accumulated real estate and buildings which it values at $600,000. A sum of $1,300,000 has been put into the property out of earnings, and, furthermore, the company has an investment of over $2,000,000 in a conduit system over and above its own requirements which may ultimately be expected to make substantial contributions to earnings through leasing arrangements with other companies.

Telephone News

Combination of Important Iowa Companies.

Announcement is made from Nevada, Ia., that arrangements have been perfected whereby the Nevada Mutual Telephone Company, The Roland Mutual Telephone Company, The Cambridge Independent Telephone Company, The Maxwell Telephone Company and The Short Line Telephone Company will be consolidated under one management in an organization to be known as the Story County Independent Telephone Company. The headquarters will be in Nevada. It is understood that Mr. F. M. Boardman, the manager of the Nevada Mutual Telephone Company, will be in active charge of the combined property.

The completion of the arrangements now in progress will give the Story County Company control of about 1,700 telephones.

Paris Loses Main Telephone Exchange by Fire.

Dispatches from Paris state that, on Sept. 20, fire destroyed the Central telephone building and the post-office, causing a loss estimated at $5,000,000. This, however, is not by any means the whole damage, for the business interests of the capital and the French provinces, as well as other cities, are suffering greatly through the interruption of communication. The loss from this cause is still greater from the fact that telegraph cables were destroyed by the fire.

The burned telephone building was comparatively new, and had been recently fitted with a new common battery switchboard. The courage of the operators came in for favorable notice, as they stayed at their positions until it was evident that it would be impossible to extinguish the flames.

At present, the officers and employees of the Department are working night and day at the utmost speed to restore connections which are so greatly needed by the business interests of the city. Within twenty-four hours, temporary switching arrangements had been provided, and terminals of the more important wires for the financial district and long distance lines, including those to London and Brussels, had been reconnected.

Rumors of Important Stock Transfers in Indianapolis Independent Companies.

Reports are being circulated in Indiana to the effect that a readjustment of the holdings of stock in the Indianapolis and New Long Distance Telephone companies is under consideration. The rumors have grown out of reports of the transfer of large blocks of stock to new hands. Statements are given out to the effect that about 50 per cent. of the stock is in the hands of President Brailey and C. C. Orthwein, of Kansas City, each of whom is said to hold about one-fourth of the stock. It is also stated that Thomas W. Finucane, Rochester, N. Y., has purchased the holdings of Breckenridge Jones, of St. Louis, and A. H. Bauer has disposed of his stock to C. C.

Orthwein. Mr. Orthwein was in Indianapolis the greater part of the past week and held several consultations with Mr. Brailey. The officials of the Indianapolis and of the New Telephone companies decline to discuss the question of a change of ownership, and are inclined to favor the belief that insufficient stock has passed to other hands to effect any change in the control of the companies.

Marshalltown Council Votes Franchise to New Independent Telephone Company.

Iowa Independents are rejoicing over the passing by the council of a franchise for a new Independent telephone system in Marshalltown, where the former company recently became affiliated with the Bell interests. The franchise was passed by the council on Sept. 14, and will come before the people for final action at the general election of Nov. 3. Special ballots will be furnished to the voters of Marshalltown, who will then have an opportunity to definitely express themselves for, or against, competition in the telephone business.

The interests behind the franchise are closely allied with the Iowa State Independent Telephone Association, and are men of ample experience and demonstrated ability in the telephone business, having for years been in charge of the successful operating Independent plants in several cities. They are fully confident of being sustained by the people of Marshalltown in their efforts to provide the city with a new Independent plant of a modern and efficient type.

Annual Meeting of Citizens Company at Grand Rapids Shows Continued Advance.

The annual meeting of the stockholders and directors of the Citizens Telephone Company of Grand Rapids, Mich., was held at the company's offices Sept. 8. A large attendance of the stockholders was present. The old directors were re-elected: C. F. Rood, Edward Fitzgerald, E. B. Fisher, William J. Stuart, Philip Graham, Cyrus E. Perkins, Lester J. Rindge, Robert D. Graham, Gaius W. Perkins, John B. Martin and Joseph B. Ware. The resignation was received and accepted with regret of James M. Barnett as trustee of the stockholders' pool, and James F. Barnett was elected to succeed him. The other trustees are Lester J. Rindge and E. A. Stowe. The directors have re-elected the following officers: President, C. F. Rood; vice-president, Edward Fitzgerald; secretary E. B. Fisher, and treasurer, W. J. Stuart.

General Manager Tarte's and Secretary Fisher's reports show the company to be in an unusually prosperous condition, and that despite the hard times that have prevailed during a portion of the past year. The company now has 26,326 telephones in use 9375 of which are in use in Grand Rapids, a gain of 501 local telephones, 1197 in Cadillac, 1901 in Lansing and 1702 in Traverse City, and a smaller number in 80 other towns in Michigan. In all the company gained 802 telephones during the year.

At Lansing a new two-story fire-proof building is being erected to house new exchange equipment which will be installed during the coming winter. At Grand Rapids another thousand automatic switches were installed during the past year, making the ninth thousand.

The report shows the long distance system of the company to consist of 1612 miles of poles, 2832 miles of copper metallic circuit, and 1100 miles of iron metallic circuit. The number of long distance messages handled during the year was 687,506 The most important addition made this year was the new line to South Bend, Ind., through which communication is had with all the northern and central parts of that state.

The following paragraph from the report of the general manager shows the sound position in which are the financial affairs of the company:

"When you take into consideration the fact that plants are being kept up to a high state of efficiency, that repairs and reconstruction are being taken care of, that a substantial and sufficient sum is charged off for depreciation, that $75,000 has been spent at Lansing during the past eighteen months for underground cable, real estate, etc., getting ready for the new exchange, and this money is not as yet earning anything, and that in spite of these conditions we have kept our plant investment per unit for the entire system as low, in fact, a trifle lower than it was a year ago, it shows a healthy and satisfactory condition in the entire system."

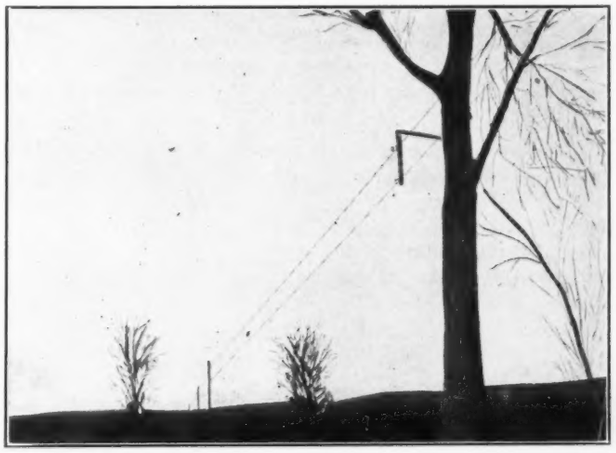
Mr. Tarte also comments on the loyalty of the employes, which he believes is fostered much by the work of the State Association of Independent Telephone Managers, which meets semi-annually.

The report of Secretary Fisher deals largely with the slight influence of the panic upon the telephone business, and appears, in part, in other pages, as do also the financial statements included in the report.

A New Home-Made Tree Insulator.

The device illustrated in the accompanyng reproduction of a photograph, is the idea of Mr. Charles Lederer, of Pierce, Neb. It gives a simple, effective method of keeping telephone wires from coming in contact with trees, and may be easily and cheaply constructed by any one who can use carpenters' tools.

The photograph shows a piece of "two-by-four" spiked



A Home Made Tree Insulator.

to the tree, carrying at its outer end an eye bolt from which is suspended a shorter piece of wood, to which porcelain knobs are attached. The wires are tied to the knobs in the ordinary manner, and thus are kept from making contacts with the tree, which might prove detrimental to the service.

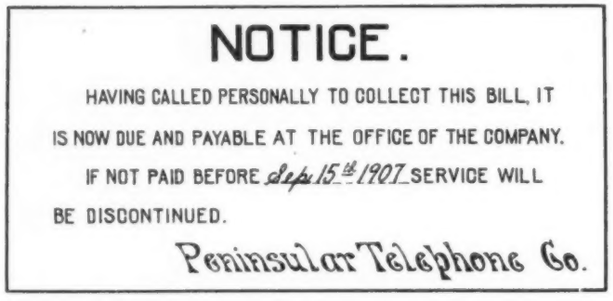
Iowa Newspapers Discuss Telephone Situation.

Long articles have recently appeared in several of the leading papers in Iowa, discussing the increasing public interest in telephone affairs in the vicinity of Dubuque. On Sunday, Sept. 13, the Dubuque Telegraph-Herald devoted nearly a page to an article on what it calls a "telephone war." It refers to the strong hold the Independent companies have upon the telephone business in the State, derived from the fact that they are principally owned by local stockholders. This has made it extremely difficult for the Iowa Telephone Company (Bell) to carry on its business, and, as a consequence, it has been unable to pay dividends.

The newspaper goes on to tell of recent events in Dubuque and vicinity, where, since the purchase by the Bell interests of the company formerly operating as an Independent, the sentiment of the public, and of small telephone companies in the surrounding country, has grown to be very much in favor of the resumption of competitive service.

A Device for Reducing Collection Costs.

Mr. A. D. Leonard, superintendent of the Peninsular Telephone Company, Lakeland, Fla., has for sometime been using, on all telephone bills sent out after the first of the


NOTICE.

HAVING CALLED PERSONALLY TO COLLECT THIS BILL, IT IS NOW DUE AND PAYABLE AT THE OFFICE OF THE COMPANY.

IF NOT PAID BEFORE Sept 15th 1907 SERVICE WILL BE DISCONTINUED.

Peninsular Telephone Co.

A Collection Slip Sent to Delinquent Subscribers.

month, the stamp reproduced in the accompanying illustration. The collector only calls once at the first of the month and, if his visit does not get the money, it is followed up by sending out of bills bearing the stamp as shown. Disconnection is made on the fifteenth of the month if the account still remains unpaid on that day. However, few disconnections are made, as the stamp has the necessary stimulating effect on delinquent subscribers.

Merger of Iowa Properties Strengthens Independents Near Dubuque.

According to reports just received from Dubuque, Ia., the purchase by the Pitcher Telephone Company, of Warren, of the property of the Tri-State Telephone & Telegraph Company of East Dubuque, materially strengthens the Independent opposition in that vicinity. The Tri-State company was a strong Independent organization operating in East Dubuque and the farming territory surrounding that place.

The Pitcher Telephone Company, which has made the purchase, has headquarters at Warren, Ill., and is capitalized at $75,000. Its officers are: F. E. Hammond, president; Joe Appel, vice-president; H. Glasgow, secretary; Jos. Hicks, treasurer; G. W. Pitcher, manager. It has exchanges in Apple River, Scales Mound, Galena, Nora, Stockton, Hanover and Woodbine. It is said to be entirely owned by strong local business men, in thorough sympathy with the Independent movement in the states where it operates.

It is understood that recently an attempt was made by the Iowa Telephone Company to purchase the Tri-State company, and the transaction just completed is especially satisfactory to the Independents as it removes the possibility of the Tri-State company passing into the hands of their competitors.

Small Company Active in Construction.

Telephone lines in and around New Wilmington, Pa., are being extended rapidly. A line in the Sharon Highway, started some time ago, meets the lines of the West Middlesex exchange of the American Union Telephone Company. At the New Wilmington exchange new terminals and protective apparatus have recently been installed, the work being in charge of Mr. Paul Schoeller, of Pasadena, California, who built the New Wilmington exchange at its inception, three years ago. This exchange, in a town of moderate size, is mostly an open wire plant, but it is planned to install considerable cable in the near future. The exchange by the end of 1908 will have 30 or more miles of good pole line in a very thickly settled territory, with most of the necessary main lines built and 150 telephones installed. The office building is to be enlarged and the operating room placed on the second floor. This exchange has a new toll line connecting the New Bedford lines with those of the Plain Grove and Blacktown telephone companies by way of New Wilmington. These lines have been built partly of 10-pin cross arms, so as to amply care for the growth of the business around New Wilmington for many years to come.

The prosperity of the American Union Company at its many exchanges in Lawrence and Mercer counties is being reflected in all the Independent exchanges of Western Pennsylvania which are connected with it by toll lines.

The Newspapers Will Not Back It Up!

What can be done to a newspaper which prints in its reading pages material for the publication of which it receives payment at certain rates per line is again made clear by the amusing action of a weekly newspaper known as "Truth," of Nunda, N. Y. On Sept. 11, doubtless because it wanted the money, this paper reproduced the article from the Boston News Bureau which referred so feelingly to the "Collapse of the Independent telephone movement."

In its next issue, Sept. 18, appeared the following:

SUPT. HAVENS REPLIES.

Says That Article Taken from Boston Paper Is Misleading.

(Communication.)

Editor Truth:—

Just a word of explanation to those who do not understand the facts in regard to the article which appeared in the columns of the Truth of Sept. 11, headed "As to Independent Telephone Companies."

I would say that the Boston News Bureau is a concern under contract with the American Bell Telephone Company to publish this and similar articles, and all articles of that nature are schemes invented by the head ones of the Bell Telephone Company and spread broadcast over the land, with the intent to deceive the general public and to damage the Independent telephone movement. If anyone doubts my assertions I am prepared to prove them.

L. C. HAVENS.
Supt. Livingston Rural Telephone Company, Dalton, N. Y.

Perhaps "Truth" does not believe in telling the whole truth, and admitting, as one of its neighbors did, that it was paid for publishing the matter. Or perhaps it swallowed the item whole, and did not get the cash which its candid neighbor obtained. But the main purpose is served, for in truth we have here a strong statement about the Boston News Bureau for the information of the local investor.

The newspapers are hardly willing to have it known, nowadays, that they will publish "corporation publicity matter" for pay, and a vigorous management can get a square deal for the Independent company it represents if it tries hard enough. But it will never get it if no attempt is made. Now is the opportunity!

Union Electric Company Plans Improvements in Iowa Tri-Cities.

Reports from Davenport, Ia., state that the Union Electric Telephone Company is having an inventory of its properties in the Tri-Cities taken, and will soon start extensive improvements in its plants at Davenport, Rock Island and Moline.

Permission to increase rates has already been granted by the city councils of Davenport and Rock Island, and it is expected that similar action will be taken in Moline.

President George Stuckey, of Harrisburg, Pa., has re-

cently spent considerable time in looking over the property and states that the owners are confident that it is a good investment, and will spend upon the plant sufficient money to develop it to meet all the demands for service, and work at high efficiency.

New Organization of Interstate Independent Telephone & Telegraph Co.

At the recent stockholders' meeting of the Interstate Independent Telephone and Telegraph Company, of Aurora, Ill., the following officers were chosen:

President, H. D. Wagner; vice-president, C. B. Cheadle; secretary, R. B. Galupp; treasurer, J. F. Harrall.

The directors are: H. H. Evans, E. R. Conklin, F. A. Dolph, J. H. Harrall, C. F. Stotzer, J. O. Barrett, A. T. Mathewson, C. N. King, A. R. Evans, Alfred Stromberg, Adam Clow, W. S. Bogle, J. H. Bliss.

The executive committee is made up as follows: Alfred Stromberg, chairman, J. F. Harrall, F. A. Rolph.

Florida Telephone Business Improving.

Reports from some of the Florida telephone centers indicate that business has made material improvement since the last week in August. Drummers are coming into the State in large numbers as a preliminary to the tourist traffic, and considerable long-distance talking is done from the larger cities to the hamlets.

The railroads are preparing for a heavy influx of visitors, and many visitors foretell big toll business for the telephone people.

Telephone Progress in Alberta.

The citizens of Alberta seem to be fairly well satisfied with the solution of the telephone problem which is being worked out by their government. At the first session of the first parliament of this new province, $25,000 was voted to provide for expenditures in connection with a telephone system, which might be the first step toward government ownership. Immediately a construction crew was set to work, under the supervision of an expert, and $23,400 of the grant was spent in construction.

During 1906 construction was commenced on a government line between Calgary and Banff, and in the spring following it was in operation. During 1907 the government built 544 miles of long distance line and purchased 53 miles, making a total of 597 miles of government line in operation on January 1, 1908. The government having shown the Bell company it was in the field to stay, and was prepared to extend its lines all over the province if necessary, the corporation began to dread the results, and when the province offered the Bell company $675,000 for its system it was accepted. Approximately 600 miles of long distance line are being built by the government this year, so that by January, 1909, there will be about 1,500 miles of government lines in operation.

Rate Increases Bring About Talk of Municipal Ownership in Oklahoma.

On Sept. 15 the city council of Tulsa, Okla., appointed a committee to investigate plans and determine the cost of establishing a municipal telephone system. This action is due to the raise in rates which the Pioneer Telephone & Telegraph Company (Bell) is endeavoring to enforce in the face of bitter public opposition. At this same meeting of the council, it was voted that each citizen should be asked to refuse to pay the increase in tariff.

Telephone for Florida Lighthouses.

The *Citizen* of Key West, Fla., proposes an improvement in the lighthouse system which seems feasible and would no doubt be of inestimable benefit. The paper says: "Effort should be made to have the government connect all the lighthouses along the reefs and keys by telephone. It would cost but a few thousand dollars, and the service would be of incalculable benefit to the lighthouses, as well as to the ships passing within hailing distance of the lights."

Michigan Traffic Association to Discuss "Through Toll" Business.

The traffic association of the Michigan Independent Telephone Association held a meeting at the office of the Citizens' company, in Grand Rapids, Thursday, Sept. 24. The special committee appointed at the Ionia convention of the Managers' Association made its report on the best methods of handling through routings and the matter was discussed.

Telephone Patents

TELEPHONE SET.

Sol. S. Sonneborn, New York, N. Y., patent 898,796, Sept. 15, 1908.

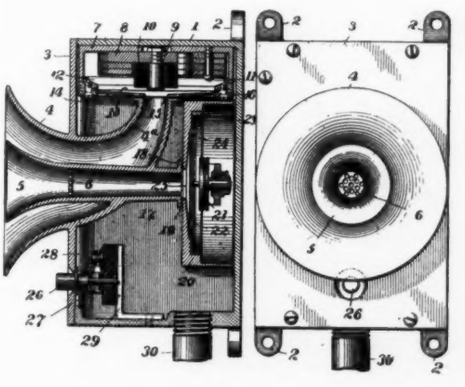
This invention relates to a desk stand in which the receiver coils and diaphragm are mounted in the base, and the permanent magnet extends upwardly into the stem. Two ear pieces are connected with the sound chamber, which encloses the diaphragm in the base, by a hollow flexible tube. A head band is provided for holding the ear pieces in position.

TELEPHONE APPARATUS.

F. W. Wood, Newport News, Va., patent 898,619, Sept. 15, 1908.

Encased transmitters and receivers similar to patent 898,620 are covered by this patent, but they are adapted for mounting on the wall. A moisture-proof casing 1 encloses a transmitter 21, and a receiver 9. The transmitter and receiver are respectively in separate compartments, which do not communicate with each other.

The transmitter is provided with a mouth-piece 5, which is concentrically located with respect to a horn 4, communicating with the receiver 9.



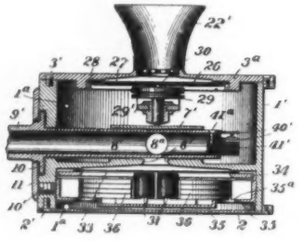
The object of the invention is to make it impossible to misuse the two horns, as would be the case where the

transmitter and receiver are each provided with a separate mouth or ear piece, as it might then occur that a person desiring to communicate would talk into the receiver, and attempt to listen at the mouthpiece of the transmitter.

BREAST TELEPHONE EQUIPMENT.

F. W. Wood, Newport News, Va., patent 898,620, Sept. 15, 1908.

This invention relates to a breast telephone equipment of particular advantage on shipboard. It comprises a casing



1', in which is mounted a transmitter 29, and a receiver 31, the transmitter and receiver being in different compartments.

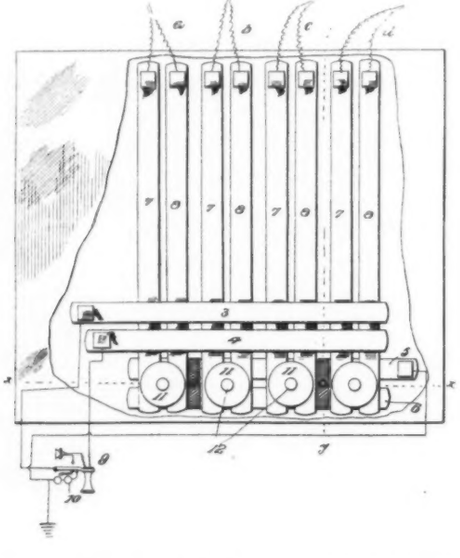
The object of the invention is to have both the transmitter and receiver in water-tight, moisture-proof compartments, and at the same time provide a double ear piece, so that extraneous noises will not affect the operation of the telephone.

The ear pieces, of course, do not have any receiver equipment mounted therein, but connect through the tubes with the receiver compartment.

INTERCOMMUNICATING TELEPHONE SWITCH.

Verne E. Green, Galva, Ill., patent 898,576, Sept. 15, 1908.

This patent relates to intercommunicating systems for telephones, the home station 9 being connected to the metallic strips, 3, 4, the other stations—*a*, *b*, *c* and *d* respectively



being connected to the pairs of terminals 7, 8. All the strips 7 connect, when in their upper position, to the strip 3, and all the strips 8 connect to the strip 4, so that all the telephones are connected together. In pressing down the strips 7 and 8 by means of the button 11, strip 8 will make contact with the strip 6, and strip 7 will make contact with the strip 5. If station 9 wishes to talk to station *c*, for instance, and on listening in, finds that stations *a* and *b* are talking, he depresses the buttons 11-11, corresponding to the stations *a* and *b*, and their circuit remains completed through the strips 5 and 6. Station 9 can then communicate with station *c* through the strips 3 and 4, the buttons 11-11 serving to disconnect any stations that are talking, from the strips 3, 4 when station 9 wishes to communicate.

TELEPHONE RECEIVER SUPPORT.

Moses M. Kahn, Louisville, Ky., patent 898,898, Sept. 15, 1908.

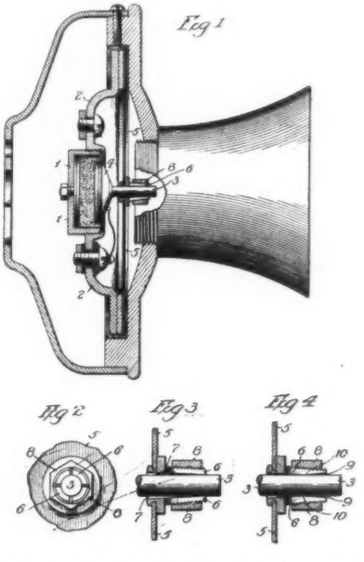
A support designed for holding ordinary hand receiver so that both hand are free for writing purposes, is covered by this patent. The contrivance consists of an arm fastened to the transmitter support, and by means of a universal joint, this arm supports a bracket of an "L" shape, which is provided at its further extremity with a double twisted support, adapted to hold the receiver when laid therein. The universal joint makes the bracket adjustable to suit the convenience of the user. The bracket has no connection with the switch-hook, and the receiver must be replaced on the switch-hook when through talking. A handle is provided on the bracket to adjust it in position.

TELEPHONE TRANSMITTER.

H. F. Albright, Elizabeth, N. J., patent 898,544, Sept 15, 1908.

This invention is designed to overcome the difficulty of connecting the stem 3, projecting from the transmitter cup with the diaphragm 5, the idea being that the stem 3 normally does not project in an absolutely vertical line through the transmitter diaphragm, and if a nut is screwed on to the stem 3 it is liable to bend the flexible auxiliary diaphragm to which said stem is connected. The flexible diaphragm forms part of the casing of the transmitter carbon, and bending is likely to cause the transmitter to remain in a permanent unsatisfactory condition.

The means used to accomplish this result comprise a



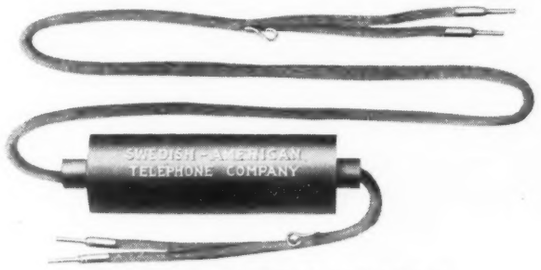
stud 6, which is firmly fixed to the diaphragm 5. The stud has a double conical central aperture which tapers from the two ends of the stud gradually toward the middle to the point 10, where it has its smallest diameter. This stud 10, therefore, will engage the stem 3 only along one circumferential line. In order to fasten the stud 6 to the stem 3, the stud 6 is provided with four slots, and a nut 8 is screwed on to the tapered outer screw-threaded surface, pressing the four quadrants against the stem 3.

In the Manufacturing Field

A New Condenser.

The Swedish-American Telephone Company has recently placed on the market a new condenser of the form shown in the accompanying illustration.

Many companies and rural line organizations hesitate to equip their bridging telephones with condensers on account of



The New Swedish-American Condenser.

difficulty in installing them. The new Swedish-American condenser presents no such difficulty. Anyone who can put a receiver cord on a telephone can install this new condenser, and just as easily and quickly. The results of its use are certain; it provides against ringing trouble on party or rural lines, and even if all the receivers on the line are removed from the hooks, any subscriber can ring through.

New Ericsson Orders.

The L. M. Ericsson Telephone Manufacturing Company, of Buffalo, N. Y., within the last couple of weeks, has obtained contracts for equipments for the Crawford Company, Mutual Telephone Company, of Robinson, Ill., the Hawkeye Telephone Company, of Des Moines, Iowa, and the Oregon Telephone Company, of Oregon, Wis.

The Crawford contract calls for a complete 5-section multiple magneto switchboard equipped with 1,170 lines and having an ultimate capacity of 2,400 lines, main distributing frame, complete power plant with storage battery, charging set, power board, etc., chief operator's desk, one two-position toll desk and a wire chief's desk.

The equipment for the Hawkeye Telephone Company is to be installed at Perry, Iowa. It consists of a three-section multiple magneto switchboard equipped with 660 lines and having an ultimate capacity of 1,600 lines, main distributing frame and a complete power plant.

The equipment called for on the above contracts is very similar to that supplied the Old Kentucky Telephone & Telegraph Company of Winchester, Ky., and shows that the many special features embodied in this type of board appeal to exchange owners. The boards are equipped with the Ericsson "Indicator Jack" which allows almost twice as many lines in the space occupied by the usual type drop and jack. Hence the space necessary for a regular drop is saved and can be applied to the multiple. It will be realized that this means a valuable gain in the operator's reach. Using an ordinary chair she can handle the calls with ease and comfort, and does not have to use a high stool.

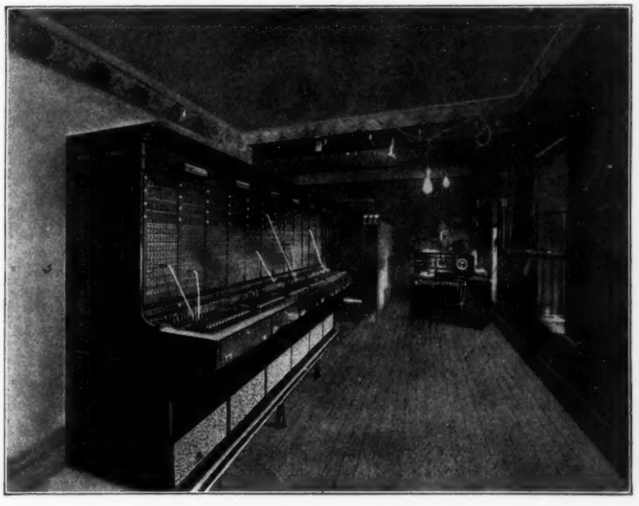
The contract with the Oregon Telephone Company calls for one type "B" section of magneto switchboard, having 100 indicator jacks and 20 mechanically self-restoring drops installed.

The Eaton Telephone Company's New Monarch Equipment.

The Eaton Telephone Company has just had installed in its exchange at Eaton, Ohio, new magneto equipment consisting of a six position multiple board, a wire chief's desk and a chief operator's desk. In selecting this equipment, the Eaton Company has shown great foresight in many ways. While at present about eight hundred lines is sufficient for the requirements of the exchange, anticipating a future growth equal to that of the past a board was ordered having a multiple capacity of 1,600 lines. The three boards were furnished by the Monarch Telephone Manufacturing Company of Chicago. The illustration of the Eaton exchange shows the large six position board and the wire chief's desk. The chief operator's desk is placed at the other end of the large board in a similar position to that of the wire chief's desk. The drops are of the Monarch self-restoring type with the armature mounted on the front of the coil shelf, making it possible to remove the coil without breaking a soldered connection or interfering with the service of the line. It also has the Monarch double wound clearing out drops which prevent a ring off passing the board and concentrates its entire force on the drop itself.

The direct current four party ringing system of the Monarch Company is used on the party lines. With this system no pole changer or other ringing device is necessary and the initial cost of installing the system is small. The ringing current is supplied by a battery of eighty dry cells and current is used only when actually ringing, therefore the battery consumption is very small. The ringers are arranged with a break contact on the principle of a vibrating bell, and, even though the batteries are almost entirely run down, the manufacturer states that this apparatus can be depended upon to give a strong steady ring. The simplicity of the principle upon which the system is based and the construction of the ringer are designed to entirely obviate any chance of false rings and make the system exceptionally reliable.

As a particularly interesting feature of this system, in



The Eaton Six-Position Board and Wire Chief's Desk.

addition to its reliability and low cost of maintenance, the manufacturers draw attention to the small cost of installation, which makes it as available to the small exchange as to one in a large town.

A New Type of Switchboard Equipment for Wallace, Idaho.

The selection of the most desirable type of switchboard equipment for use in a small, growing city exchange, requiring an initial installation of from three to five positions,

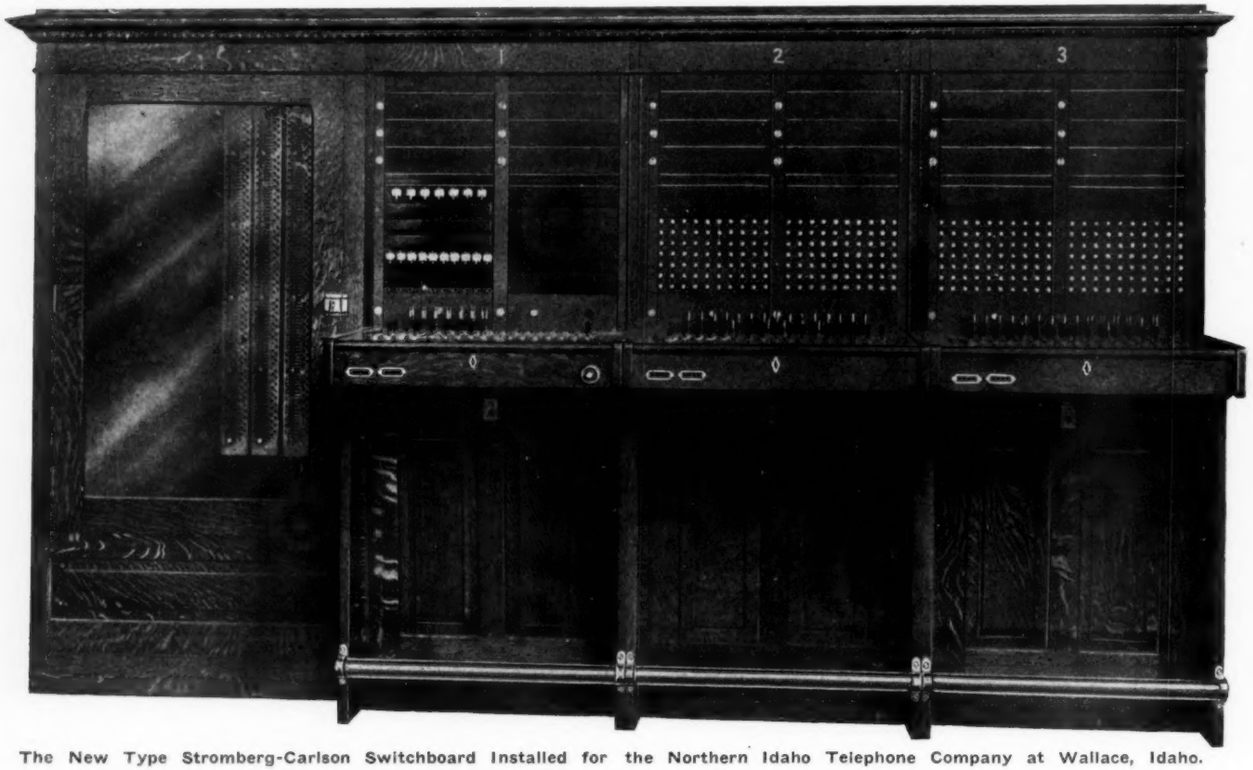
has proved a perplexing study to many an exchange manager. Though it is quite generally conceded that, for the average new exchange of this size, a common battery lamp line system should be selected, the respective merits of the multiple and transfer systems in their relation to the local conditions, present a problem for careful consideration.

In cost of installation the transfer system is much the lower, and very satisfactory service may be maintained on boards of from three to four positions, but as the exchange develops above that point, the percentage of trunked calls increases at an alarmingly rapid rate. Each trunked call necessarily requires the services of two operators, and two sets of cords, with a consequent drag on the service; appreciable chance for error is also introduced in repeating the instructions over the order wire between positions. As the number of trunked calls increases, the total number of lines handled by each operator must necessarily be reduced, thus increasing the total number of operators required, and the operating expense, at a rate much exceeding the growth of the exchange.

small exchange, as outlined above, the engineers of the Stromberg-Carlson Telephone Manufacturing Company have produced a switchboard as illustrated in the accompanying views, this equipment having been installed for the Northern Idaho Telephone Company, in its exchange at Wallace, Idaho.

Each section consists of a one-position cabinet of quarter sawed oak with golden oak finish. The apparatus associated with each position is all mounted within the cabinet, making each section a complete switchboard unit capable of being operated as an isolated exchange, or in connection with other similar sections placed by its side.

The switchboard for Wallace consists of three sections, the first equipped as a night toll position, and the other two as regular subscribers' positions. At the left of the night toll section will be noticed a cabinet containing a connecting rack. All line cables from the main distributing frame terminate on this rack, from whence the circuits are continued to their respective sections. As the growth of a board requires the equipment of the multiple, these cables



The New Type Stromberg-Carlson Switchboard Installed for the Northern Idaho Telephone Company at Wallace, Idaho.

From an operating standpoint, the advantage is manifestly with a multiple system, the services of but one operator being required in completing each and every connection, thus insuring rapid and accurate service. The cost of a standard multiple equipment, however, has often prohibited its adoption. Besides the main distributing frame, the usual multiple system requires an intermediate frame, and relay rack, demanding additional floor space; a much larger amount of cabling is necessary than on a non-multiple board, and the services of an expert are demanded to install this type of an exchange in a satisfactory manner. Also, as the majority of multiple switchboards are constructed with three positions to the section, it was often found imperative to install perhaps two or more positions than were at the time demanded for the size of the exchange.

Wishing to retain the advantages of a multiple system, and at the same time to eliminate its objections for the

are also carried from this rack up a cable chute and along the multiple cable shelf, visible in the rear view, each cable serving multiple jacks in every third position. An ultimate capacity of 1800 multiple jacks within the reach of every operator is in this manner provided. Besides the subscribers' multiple, space is also returned in each section for 80 outgoing trunk lines.

The regular positions are each equipped with 140 lamp lines, 15 pairs of cords, six plug ended trunks leading to the toll board, five order wire circuits, a master key for four party harmonic ringing, position switching key, line and supervisory pilot lamps, and an operator's breast plate transmitter set, with duplicate jacks. In the night toll position are found 10 toll line equipments, wiring having been provided for an ultimate of 40. The keyboard is at present equipped with three "toll to toll" cords, and four "toll to central energy" cords, besides the master key and operators' equipment as found in the regular positions.

Several points of interest are to be noted in the arrangement within the cabinets, an effort having been made to place each piece of apparatus in a position readily accessible both for installation and repairs. The line relays are located in a dust-proof compartment immediately beneath the cord rack. The cord relays mount below the line relays, each set being protected by an aluminum casing, while at the bottom of the cabinet, space is provided for a line cable runway. On the rear of the cord shelf, where most accessible to the troubleman, are placed the various battery distribution bars, fuses and power terminals. The condensers are placed on a rack supported by a steel frame in the roof of the cabinet. By removing the panel beneath the key shelf the cords are exposed, and the removal of a second panel behind the cords gives access to all connections on the various relays.

The main distributing frame is of the usual steel construction, consisting of six verticals, or 600 line capacity on the arrester side, and 750 on the line cable side.

Rear View of the Wallace Switchboard.

The power equipment for the Wallace exchange consists of two sets of the National Battery Company's storage cells, each set consisting of 11 type V-11 tanks, equipped at present with type V-5 elements; a 30 ampere General Electric mercury arc rectifier charging set, and a Stromberg-Carlson Monson slate power board equipped with Weston voltmeter, ammeter, and the necessary switches for the operation of the various circuits. A Holtzer-Cabot four frequency converter is also installed for furnishing the ringing current. Upon the converter are mounted duplicate sets of vibrators, either vibrator on any frequency being thrown into circuit as desired.

The Sumter Telephone Manufacturing Company, Sumter, S. C., has received some interesting comments expressing the satisfaction of purchasers of its desk set, which has now been upon the market for some time. A particularly interesting feature of this set is the readiness with which it may be dissembled without the use of tools, other than a screw-driver to remove the single screw which fastens the plate forming the bottom of the stand. Another practical point which is appreciated, is that the screws which fastens cord terminals have large sized heads. It is unnecessary for the troublemen to carry special small screw-drivers for use on these. The hook lever and switch mechanisms also possess novel features of merit.

New Names for Matthews' Specialties.

The following letter has been received from W. N. Matthews & Bro.:

"Some of your readers may be interested in knowing our reason for dropping the old names of all of our specialties and substituting therefor the possessive name of 'Matthews'.'

"Careful investigation has shown us that the name of W. N. Matthews & Brother is better known than Widmer, Hargis, Teusch, Callahan, Kearney and the names of other inventors of Matthews' specialties, under which we have advertised them heretofore. Each of these specialties has been advertised extensively under its name, but in each case over our name Thus our name has been advertised ten times for every once that the name of any one of the ten specialties that we manufacture has gone before the public.

"It seems to us that it will be an aid to identification, and of great assistance to all those interested in our goods, for us to identify them as ours by giving them our name.

"We want the name 'Matthews' to be synonymous with "Money Saver." We are never going to sell anything that will bring discredit upon the name 'Matthews'. To have that name placed before it, a specialty must be a money-saver; it must be made of the best material and in the best way; it must be patented; and it must be so superior that

we can afford to ship it on trial, to be paid for only if satisfactory, and with the privilege of return if it is not.

"The above mentioned changes may cause a little confusion at first, but we will endeavor to dispel this as soon as possible. All orders will be shipped promptly as heretofore, whetner our customers use the old names or the new, but we will appreciate it if they will help us to make the change as quickly as possible.

"In closing, let us add that, as all of our specialties are patented and as we either own or control them for their life, we will exercise all of our rights in protecting the interests of ourselves and our customers against any persons who may infringe our rights under these patents."

Very truly yours,

W. N. MATTHEWS & BROTHER.

Twenty Years With One Firm.

Mr. H. W. Reade, treasurer of the National Pole Company, Escanaba, Mich., on Sept. 25 celebrated the twentieth anniversary of his connection with that company and its sister company, the Pittsburgh & Lake Superior Iron Company. Mr. Reade is one of Escanaba's most popular and public spirited citizens, being president of the school board

Mr. H. W. Reade.

and a leading factor in the city's educational, religious and social institutions, as well as a successful business man who is well known and liked throughout the telephone field.

A New Unit Type Combined Switchboard Drop and Jack.

The American Electric Telephone Company, Chicago, Ill., is just beginning the manufacture of a new switchboard which is designated as the Burns' Express Type. The combined drop and jack is of the unit type, which permits the terminal apparatus for every single line to be removed from the switchboard at any time without disturbing the connections or adjustment of any other jack or drop in the board. The restoration of the shutter, after the receipt of a call, is accomplished mechanically when the operator plugs into the jack.

The electromagnet portion of the drop is so designed that, in order to obtain the highest efficiency, by suitably proportioning its winding, the drop coil may be wound for use upon city exchange work, farmers' line service, and the most exacting long distance or toll line service without any change in the mechanical construction.

As, when the drop is taken out of the board, a coil may be quickly removed, a simple substitution of the proper coil in a drop permits connecting any local jack to a toll line with an assurance of increased efficiency, thereby producing improved facilities for a long distance service in a small exchange switchboard at a nominal expense.

Fig. 2 shows the appearance of the drop coil, withdrawn from its iron shell. The projections immediately under the left hand end represent a fibre block, bearing the contacts

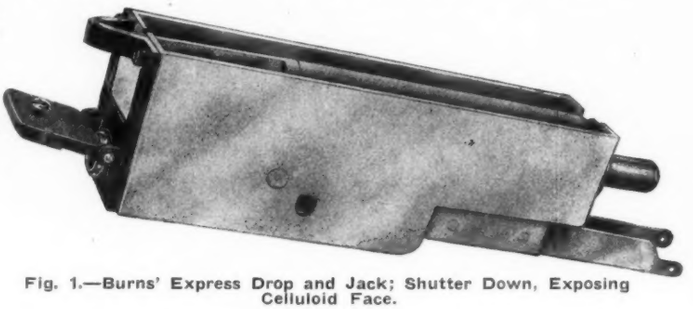


Fig. 1.—Burns' Express Drop and Jack; Shutter Down, Exposing Celluloid Face.

through which connections are made to the springs of the jack.

Fig. 3 shows how the coil is mounted in the case. In order to remove the drop coil, together with its incasing shell, it is only necessary to slacken up the screw which is shown projecting from the right hand end of the core, and lift the entire combination of coil and core from the casing.

The guard, which is placed over the armature hook to prevent damage through accidental contact with the connecting plugs, is an interesting construction feature.

A significant feature, in connection with the introduction of the Burns' Express Switchboard, consists in the provision for the removal of any drop from the switchboard without disturbing the wiring of any other. This plan was adopted by the inventors only after during their long experience they had introduced into service thousands of drops of the "unit removable" type and an equally large number of the type where more than one drop requires to be disturbed when removing all of the elements belonging to a certain line equipment. In accordance with the law of the "survival of the fittest," the present combined drop and jack was made of the "unit removable" type. Further, as contact springs on the drop so connect with the jack that when a drop is removed from the switchboard the unsoldering of any permanent connections is not required. The line wires are brought to the rear of the switchboard and terminated in suitable connectors, while the rearwardly extended portions of the jack are of sufficient length to make contact with the line clips, which are permanently mounted in the board. Once a board is installed properly, all work

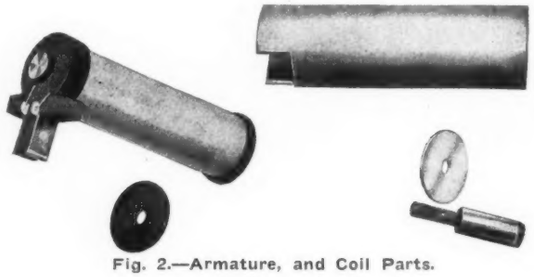


Fig. 2.—Armature, and Coil Parts.

on jacks or drops can be done from the front, and no soldering iron is necessary.

Great difficulty is encountered in constructing contacts that will properly close a night bell circuit every time a call is made upon the switchboard. Solid contacts were originally applied to night bell service, but found unsuitable, owing to the difficulties experienced in keeping the contacts clean. Springs were then almost universally adopted, and in many forms are now considered a necessary

evil. However, the Burns express drop is provided with a novel form of night bell contact, which may be easily explained by reference to Fig. 5, where the insulating block immediately behind the front of the drop is shown perforated by an opening. It will further be observed that the shutter has an extension toward the bottom. When the shutter is in its downward position, as shown in Fig. 1, the extension projects into the opening shown in Fig. 5.

Fig. 3.—Sectional View of Drop and Jack, Assembled.

It will now be evident that, with the frame of the drop forming one side of the night bell circuit, it is only necessary to place a contact rod through the opening so it will make connection with the shutter in order to produce the complete night bell circuit, for the rod will then form the remaining side of the night bell connection.

In this connection, the method adopted for using the night bell rod as a fastening device for the drops is of interest. These drops are assembled in a switchboard in the usual manner, and the night bell rod is made of sufficient length for passing quite through the mountings of an entire vertical series of drops. Therefore, it will be readily understood that with, say, ten drops placed one above the other, the rod, which is made very substantial and perfectly polished, is passed vertically down through the openings, shown in Fig. 5, and so arranged that after giving the rod a few turns to the right, the drops are all locked together. To clean the night bell contacts, the operation consists substantially of removing and cleaning the rods.

The switchboard contains many additional features of novelty. For example, the connections of the windings of the drops, as shown in Fig. 2, are brought to the sides of the fibre head piece. These engage directly with the jack contacts, shown in Fig. 5. Through this form of construction it will be observed that whenever a plug is placed into the spring jack the associated drop coil is entirely disconnected from the circuit. The winding space is large, and the manufacturers state that the drops intended for local exchange service will respond to a telephone generator current through a resistance of 10,000 ohms and over.

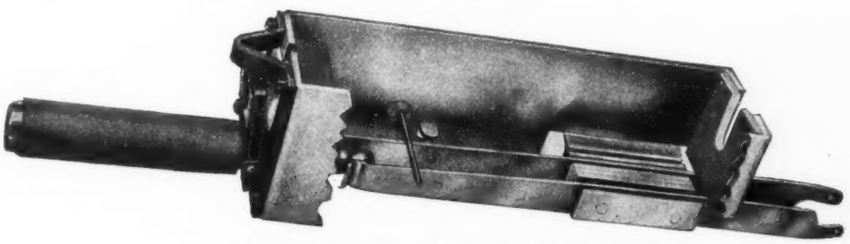


Fig. 4.—Sectional View, Coil and Armature Removed.

The new drop contains a very small number of pieces, which is a valuable consideration from a maintenance standpoint. The materials selected for the construction of the drop and jack are reported by its makers to be of the best. The iron used for the core and the inclosing shell is especially annealed, and is thoroughly tested for residual magnetism, which always affects the operation of apparatus of this kind. The spring jack material is of the best obtainable, and in fact all parts of the drop are designed with a view to producing an article in which all undesirable points have been eliminated.

Cedar Pole Specialists.

The Krueger & Grant Lumber Company, a firm of cedar pole specialists, has been doing business in Minneapolis, Minn., for nearly four years. Prior to that time Mr. Krueger was in the employ of the McCulloch & Moss Lumber Company for several years; also had been with the Fay & Morrison Lumber Company, of Minneapolis, for four or five years, that firm being later succeeded by the J. W. Morrison Lumber Company, with which Mr. Krueger remained for about a year. This experience has given Mr. Krueger a thorough and practical knowledge of the cedar pole business, which he endeavors to use to advantage in serving the firm's large list of customers.

Previous to the organization of this firm, Mr. Grant had spent 12 years principally in the producing and manufacturing districts of northern Minnesota, working part of the time for himself in getting out posts, poles, wood, etc., on a small scale, and also working in the camps for producers and manufacturers in the capacity of inspector, etc. Mr. Grant at the present time is looking up stocks and taking care of the loading to see that all material is graded right, that the firm's customers may get exactly what they order. The practical knowledge obtained from his former experiences has well fitted him for this work.

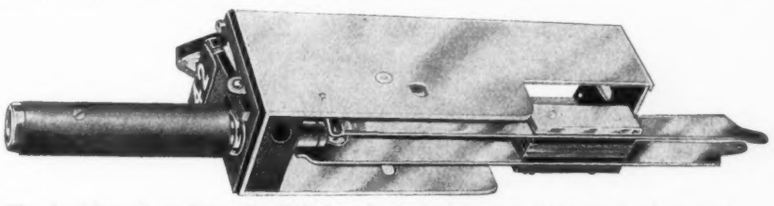


Fig. 5.—View from Beneath, Showing Jack Springs and Hole for Locking Rod.

Most of the company's cedar poles are on the Minnesota & International and Great Northern railroads in Minnesota. It also does an extensive business in jobbing stock from Michigan and Wisconsin points. From this it will be seen that the firm can ship white cedar poles to almost any point in the states west of the Mississippi river, and to Illinois and Wisconsin to advantage, giving customers the benefit of lowest rates.

Valuable Political Atlases Sent Free.

"Something for nothing" is obtainable at last—actually, and with no string to the offer! Rand, McNally & Co., as nearly everyone knows, have compiled a "Political Atlas," giving a brief history of all administrations up to the present time, illustrated by portraits of the presidents, and live information, of a non-partisan character, for the man interested in present national issues and candidates. A large map of the United States carries figures showing the electoral vote in 1904. A further interesting feature is a tariff curve showing variations in the annual average *ad valorem* rate of duty collected on imports from 1791 to 1901.

This is a valuable book, and while a special edition is being distributed free, to telephone managers and officials, by the Automatic Electric Company, its worth is in no wise diminished by the mention of the givers, which appears only upon the covers, and is in no wise obtrusive.

New Orders for Equipment.

The Swedish-American Telephone Company reports having recently secured a contract from the Tazewell County Mutual Telephone Company, of Tremont, Ill., for 600 telephones, two 300-line switchboards and one 150-line switchboard. The Tazewell company propose to cover the entire county with a modern system. Other companies which are reported to have recently contracted with the Swedish-American for their complete exchange equipment and telephones, are:

Eckman Telephone Company, Eckman, N. D.; Martin Telephone Company, Martin, N. D.; Mutual Telephone Company, Hillsdale, Ind.; Burnt Prairie Telephone Company, Burnt Prairie, Ill.; Lawton Telephone Company, Lawton, N. D.; Farmers' Telephone Company, Hartland, N. B., Can.; Minora Telephone Company, Minora, W. Va.; East Union Telephone Company, Salina, Kans.; Farmers' Merchants Telephone Company, Flaxton, N. D.; Hosper Telephone Company, Hosper, Iowa; Searsboro Telephone Company, Searsboro, Iowa; Farmers' Telephone Company, Karbers Ridge, Ill.; Erie Telephone Company, Hagersville, Ont., Can.; East Walton Telephone Company, Zurich, Kans.

THE BLAKE SIGNAL & MANUFACTURING COMPANY, Boston, Mass., continues not only to make extensive sales of its convenient soldering flux, known as the "Blake Tube Flux," but to receive evidence of genuine satisfaction in the form of testimonial letters from customers. This commends itself to telephone men, being convenient to use because just a sufficient quantity of flux may be forced at any time from the flexible tube through the small, rigid nozzle. This eliminates waste, and also promotes cleanliness in doing work.

THE AMERICAN CIRCULAR LOOM COMPANY, Boston, Mass., has for some time been supplying its flexible insulated conduit to telephone companies, and, in many parts of the country, this is now extensively used to protect telephone wiring. It is especially valuable for use in cases where existing wiring is not up to standard, and it is desirable to protect short lengths electric light wires, water pipes, etc. Its judicious use has been found to reduce the amount of trouble, particularly in common battery exchanges.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

Personal.

MR. A. L. MARTIN has been appointed manager of Kinkaid (Kan.) office of the Eastern Kansas Telephone Company.

MR. SPENCER BASS has been appointed manager of the Kinloch Telephone Company's exchange at St. Charles, Mo.

MR. W. R. HARRIS, the well known telephone construction engineer, member of the firm of Harris, Craven & Von Borries, Louisville, Ky., was recently a candidate for the position of city engineer, and, owing to what is considered to have been unfair political opposition, had a rather unfortunate experience.

Mr. Harris was induced to stand as a candidate at the earnest solicitation of many representative business men, who wished him to fill the position because they were convinced that he would give everyone a square deal. The board of examiners, in their report of the tests to which the candidates submitted, stated that Mr. Harris passed with the most points to his credit, his average being 95.45 per cent. Of the other candidates, John Chambers received 90.8 per cent, and C. H. Blackman 84.8 per cent. In spite of his unquestioned superiority in the test, and his high reputation and experience, Mr. Harris failed to receive the appointment, which was awarded to Mr. Chambers.

In making this appointment, the mayor and the board of public works are widely criticized for having disregarded the wishes of the leading business men of the city.

NEW COMPANIES.

LOS ANGELES, CAL.—Articles of incorporation have been filed by the El Monte Home Telephone Company, with a capital stock of $25,000. The directors are J. S. Kilian, F. P. Sappington, J. Kauffman and A. F. Snell, of El Monte, and Edgar O. Fawcett, of Pasadena.

SIGEL, ILL.—There is talk of organizing a mutual telephone company in this city. The following committee has been appointed to look into the matter: B. H. Kunkler, Lon Bibler, Barney Neibrugge and Henry Gillmore.

IOWA CITY, IA.—The Union Farmers' Mutual Telephone Company has been incorporated, the initial board of directors being: James Hogan, M. C. Rohret and Will. Hradick. The first officers are: Louis Rohret, president; Henry Rohret, vice-president; John C. Scheetz, secretary, and Nicholas Scheetz, treasurer. The capital stock is $10,000.

ARLINGTON, KAN.—The Arlington Central Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are: A. C. Polk and D. Mayes, of Prague; C. C. Pharris and others.

AVIS, KY.—The Avis Telephone Company has been incorporated in this city with a capital of $200. The incorporators are James C. Halt, Alonzo Harris and William Blair, all of Avis. Beginning at once lines will be built from Avis to Artrip, a distance of 15 miles. William Blair, Avis, is manager.

CAMP KNOX, KY.—The Camp Knox and Middletown Telephone Company has been organized here with a capital of $300, by T. J. Mercer, J. J. Booker and Albert Mercer, all of Camp Knox, Ky. Construction work will be begun soon. J. J. Booker, Camp Knox, Ky., is manager.

NEW YORK, N. Y.—The Westchester County Automatic Telephone Company has been incorporated with a capital stock of $100,000 by Frederick Hughes, H. Degnon and J. L. Abrahams, all of Yonkers.

BETHANIA, N. C.—The Rural Telephone Company, which contemplates the erection and operation of telephone lines in Forsyth, Surry, Stokes, Yadkin, Wilkes, Davie, Rockingham, Davidson and other counties, has filed articles of incorporation. The company is capitalized at $24,000, and the incorporators are: W. B. Little, H. A. Peddycord, Geo. H. Hauser and others.

COLUMBUS, OHIO.—The Milford Home Telephone Company, of Milford, has been incorporated with a capital stock of $10,000.

COLUMBUS, OHIO.—The Lemoyne Telephone Company, Lemoyne, has been incorporated with a capital stock of $10,000. The incorporators are Joseph H. Herman, president; E. G. Baker, secretary.

DUKE, OKLA.—The People's Telephone Exchange Company of this city has filed articles of incorporation. Its capital stock is placed at $20,000, and the incorporators are: G. C. White, T. W. Alexander, J. H. Peters and others.

GUTHRIE, OKLA.—The Oklahoma Camera Telephone Company of Oklahoma City has been incorporated with a capital of $10,000. The incorporators are: G. W. Logan and Leo S. Reed, of Denver, Colo.; Ed Overholzer, of Oklahoma City.

ASTORIA, ORE.—A number of citizens of Astoria, among whom is Geo. W. Sanborn, propose the organization of a local telephone system. Long distance connection with the Northwestern Long Distance Telephone Company will be obtained if the plans materialize.

SUMAS, WASH.—L. G. Van Valkenburg has just perfected the organization of a rural company, to build and operate telephone lines and exchanges in British Columbia territory adjacent to this place.

KINTORE, ONT., CAN.—The Missouri Telephone Company has been incorporated with a capital stock of $15,000 by D. McMillan, W. I. Hogg, W. H. McGee and others.

MULL, ONT., CAN.—The Farmers' Long Distance Telephone Company has been organized with a capital stock of $40,000. The company is a consolidation of two local companies, and is planning much new construction work. The officers of the company are: Neill Watson, of Mull, president; James Rutherford, of Blenheim, vice-president, and L. Edmunds, of Blenheim, secretary.

NEW DUNDEE, ONT., CAN.—The New Dundee Rural Telephone Company, Ltd., has been incorporated with a capital of $10,000. The incorporators are: J. C. Hallman, A. McDonald, W. Erb and David Bergey, all of the township of Wilmot, and Amos Hilborn, of New Dundee.

FINANCIAL.

DECATUR, IND.—The Citizens' Telephone Company of this city has declared a 6 per cent dividend.

RICH HILL, MO.—Articles of agreement increasing the capital stock of the Happy Hill Telephone Company, from $500 to $750, have been filed at Butler.

JUNIUS, N. Y.—At the annual business meeting of the Junius Telephone Company, the secretary reported the company free from debt and a cash account on hand.

FRANCHISES.

WILLOWS, CAL.—The Glenn County Telephone Company was recently awarded a franchise to construct its lines in Willows and operate a complete telephone system.

ALEXANDRIA, IND.—The Alexandria Telephone Company, heretofore a farm line, has received a franchise to operate within the city limits, agreeing to establish a modern exchange as soon as one hundred telephones are obtained. The franchise will be forfeited if the company sells its interests to the Bell company or the Delaware and Madison Counties company, both of which now maintain exchanges here.

YORKVILLE, S. C.—Application for a renewal of its franchise in this city, which expires next April, is to be made by the Piedmont Telegraph & Telephone Company. It is its intention to put in three miles of cable on the streets, make all lines metallic and to place its system in first-class condition in every respect.

WICHITA FALLS, TEX.—The Chamber of Commerce has adopted a resolution demanding that the city council annul the franchise of the Southwestern Telephone Company because of inadequate service.

ELLENSBURG, WASH.—The city council has granted a twenty-five year franchise to the Home Telephone Company to build and operate a telephone system in this city.

CONSTRUCTION.

PHOENIX, ARIZ.—The People's Independent Telephone Company of Phoenix is constructing two new lines, one north and one west of town, which will connect with ranches in that territory.

NASHVILLE, ARK.—The Nashville Telephone Company has commenced construction of a rural line from Nashville to Doyle, Bolton and Westbrook.

MAYSVILLE, ARK.—A telephone line is being constructed between this place and Cherokee City by Geo. W. Watson of Gentry and W. Mack Watson of Maysville.

COLUSA, CAL.—The Colusa County Telephone Company has made connections at Stonyford which will enable its patrons to communicate with the western parts of Colusa and Glenn counties. Another line will be built up the river from Glenn, giving the company's lines connection with every town in Glenn county. The company now has over 600 telephones installed in Colusa County.

HAVANA, FLA.—The Havana Telephone Company, which is owned by Dr. Moore, of Tallahassee, expects to entirely rebuild its system in Havana, and to make it modern in every respect.

CARBONDALE, ILL.—Extensive improvements in the local telephone equipment are now being made by Superintendent Aldridge of the Ohio & Mississippi Valley Telephone Company, and a large force of men. New poles are being placed and practically the whole city will be re-wired. The improvements being made mean an almost entire re-construction of the local telephone system.

NEOGA, ILL.—The Neoga Telephone Company has put in a new switchboard.

PEARL CITY, ILL.—The Pearl City Telephone Company is rebuilding its lines in this vicinity and putting everything in first class condition.

WATERMAN, ILL.—The DeKalb County Telephone Company is putting up new poles which are ten feet higher than the old ones.

ELDORA, IA.—The Eldora Mutual Telephone Company is advertising for bids for the erection of its new building.

MASSENA, IA.—The Massena Telephone Company has decided to enlarge its exchange.

WEBSTER CITY, IA.—The Martin Telephone Company has just completed two new copper circuits to Fort Dodge, making five circuits now in use. The new improvement will be of great assistance to patrons and is in line with other improvements planned by this company.

CHERRYVALE, KAN.—The Cherryvale Telephone Company is just completing the work of putting in a new 50-pair cable. There are now more than 500 telephones in use in town, besides about 200 in the country.

JUNCTION CITY, KAN.—The Wareham-Dewey Telephone Company expects to make many improvements in its system in Junction City. Old lines are to be overhauled, a number of new ones built and its switchboard capacity increased. It is expected that a similar course will be pursued by the company with its plant at Manhattan.

PAOLA, KAN.—Hodges Brothers are making an expenditure of $4,000 on equipment for their local telephone exchange. Two new switchboards have been received and the three old ones are being overhauled.

SALINA, KAN.—The Salina Telephone Company has started work on the construction of the new line to Brookville, 18 miles west of here.

SALINA, KAN.—The Farmers' Mutual Telephone Company, organized to cover the territory southeast of the city, covering a territory of 25 miles or more, expects to begin construction within a short time. The officers of the new company are: John Sheldon, president; Nicholas Vogelsberg, treasurer; Scott Mongold, secretary.

ARMINTA, KY.—The Bull Creek Telephone Company announces that it will extend its line from this place to the vicinity of Sassafrac, Ky., beginning construction soon. Construction material will be needed. Address, J. D. Blair, manager, Arminta, Ky.

DEMOCRAT, KY.—The Upper Rockhouse & Beaver Creek Telephone Company is securing a franchise for its telephone line from Colson via Democrat and Deane to Beaver Creek. It is announced that two short-line branches will be built within the next few weeks. Dr. T. A. Cook, Democrat, Ky., is manager.

SERGENT, KY.—The Letcher County Home Telephone Company is securing rights-of-way for a new Independent line from Vilas, via Wright, to Bentley, Ky., construction of which is shortly to be begun. A franchise will be secured at once. W. B. Webb, of Sergent, Ky., is manager.

THORNTON, KY.—The Thornton-Colly Telephone Company is making some improvements on its line. In many places new poles will be set and the line improved generally. Some short extensions, in which material will be needed, are planned. John S. Webb, Thornton, Ky., is manager.

WHITEBURG, KY.—The Whiteburg Telephone Company is making preparations for the building of a local Independent line from the mouth of Pert Creek up Kentucky River and Colly Creek to Blair's Branch of Colly, a distance of five miles, making connection with an important section of the county. S. H. Fields, Whiteburg, Ky., is manager.

APPLETON CITY, MO.—The Center Telephone Exchange Company is installing a new switchboard in its exchange in this place. Other improvements to its system are planned.

FULTON, MO.—The lines of the Red Star Telephone Company are being extended in Fulton.

JAMESON, MO.—The construction of new lines throughout the city has been begun by the Jameson Telephone Company.

NEW FRANKLIN, MO.—The Mutual Telephone Company is constructing a number of new lines in New Franklin, to take care of its greatly increased business. Long distance service is obtained by connecting with the lines of the Kinloch company at Boonville.

BOZEMAN, MONT.—The common battery exchange of the Home Telephone Company has just been completed and the subscribers are being rapidly connected up.

HAMILTON, MONT.—The Bitter Root Telephone Company of Hamilton, is constructing new country lines, and anticipates making further enlargements in the near future.

HOOPER, NEB.—The new telephone line west of Hooper will be completed in a very short time and twenty-five new subscribers will be placed on the list. With good weather the Hooper Telephone Company will have 500 subscribers before January 1.

PLATTSBURG, N. Y.—The new Ellenburgh Telephone Company has its switchboard installed at Ellenburgh Center. Two hundred and fifty patrons have signed for the service. The Franklin County Telephone Company will connect at Mooers Corners and the Clinton Telephone Company will connect from Mooers Forks. This will give a through service from Ogdensburg to Albany. Over seven miles of poles are already set.

ROME, N. Y.—At a recent meeting of the Water and Sewer Board several propositions were received from telephone companies for constructing four and one-half miles of telephone system from Stokes to the dam site in Fish Creek, but no definite action was taken, as the matter is to be further considered.

WADE HOLLOW, N. Y.—The Northern Tioga Telephone Company is extending one of its new lines through Wade Hollow.

HILLSBORO, N. D.—The Traill County Telephone Company has undertaken some extensive improvements of its system in this city with the view of putting it in first-class up-to-date condition. It has enlarged its central offices and is now installing a new switchboard. Larger poles are being set and cables being strung in place of open wires.

VOLANT, PA.—The Plain Grove Telephone Company has completed a toll line from its exchange at Volant, Pa., to the Mercer, Pa., exchange of the Union Telephone Company.

ZELIENOPLE, PA.—The People's Telephone Company is pushing to completion as fast as possible its lines and equipment in this end of the county. It is expected that service can be given in 30 days, and in six weeks more, it is hoped to be possible to give service to Ellwood, New Castle and the Beaver valley towns over the lines which are now being extended and built in that direction. The company has strung between 16,000 and 17,000 f'. of cable in this community.

KINSMAN, O.—The Jefferson & Warren Telephone Company is putting up a copper toll wire from Kinsman to Warren via Cortland.

NORTH POWDER, ORE.—The Government telephone line from

Starkey, through the mountains of Whitman National Forest, by way of the North Powder Lakes to Cableville, is completed and in good working order. This new line gives the forest supervisor at Sumpter direct communication with the lakes, Sheep Ranch, Starkey, Hilgard, Lehman Springs and all points between there and Pendleton.

COOKEVILLE, TENN.—The Gainesboro Telephone Company has bought of Judge J. W. Puckett a valuable piece of property on Broad street, near the public square, and will soon begin the erection of a modern brick building, in which will be located the company's general offices, which will be removed from Sparta to this city.

MATAGORDA, TEX.—W. E. McNabb is superintending the work of repairs on the telephone line between here and Bay City for his brother, A. W. McNabb, who contemplates putting in the telephone exchange at this place provided he can get enough subscribers. It is thought that he will, as the people are coming forward very promptly.

MONROE, WIS.—The United Telephone Company will build a line eight miles north of Monroe into Washington township and a shorter line to the Jacob Huffman farm in Clarno.

TWO RIVERS, WIS.—A telephone line will be construcied from this city to the Twin River Point light house by the Two Rivers Telephone Company.

WINNIPEG, MAN., CAN.—It is announced that the suburban telephone exchange in Fort Rouge will be ready for operation by Jan. 1, 1909, from which date all telephones in the south end of this city will be operated from that exchange.

ELECTIONS.

FORREST CITY, ARK.—At the meeting of the stockholders of the Forrest City & Cut Off Telephone Company at Forrest City, recently, the following board of directors and officers were elected: J. J. Barron, Dan Wylds, J. H. Dansby, S. L. Hodges and J. J. Pipkin. J. J. Barron, president; Mrs. T. Prude, secretary and treasurer.

URBITA, CAL.—The following officers of the Union Home Telephone Company were elected at the annual meeting: President, George B. Ellis; secretary, Fred E. Smith; manager, Fred W. Ellis.

AURORA, ILL.—The following officers have been elected by the Inter-State Telephone Company: President, H. D. Wagner, Hinckley; vice-president, C. B. Cheadle, Joliet; treasurer, J. F. Harral, Aurora; secretary, R. B. Gallup, Aurora; executive committee, Alfred Stromberg, Chicago; J. F. Harral, Fred A. Dolph.

HILLSBORO, ILL.—At a meeting of the stockholders of the People's Mutual Telephone Company, the following directors were elected to take the place of August Kellenberger, of Litchfield; George W. Rainey, of Litchfield, and A. G. Butler, of Fillmore, whose terms have expired: W. R. Gunn, of Raymond; C. E. Landers, of Coffeen, and Victor A. Bost, of Fillmore. The board of directors of the People's Mutual Telephone Company now consist of: R. P. Barnard and A. K. Vandever, of Nokomis; George D. Taylor, of Litchfield; B. A. Stead, of Farmersville; Rufus Cruthis, of Sorento; Dr. M. L. Moyer, of Hillsboro; W. R. Gunn, of Raymond; C. E. Landers, of Coffeen, and V. A. Bost, of Fillmore.

KENNEY, ILL.—The Kenney, Chestnut & Farmers' Mutual Telephone Company recently elected the following officers: President, W. E. Schoby; vice-president, F. Stoutenborough; secretary, A. J. Blangy; treasurer, W. B. Montgomery; director, for three years, Henry Gobleman.

RUTLAND, ILL.—The following directors have been elected by the Central Illinois Independent Telephone Company: Perry Morgan, of Long Point, to succeed Frank Bosserman, and F. H. Jackson, of Rutland, to succeed M. C. Rose.

WATERLOO, ILL.—The Farmers' Fountain Telephone Company has elected the following officers: Louis Vogt, president; E. W. Loehr, treasurer; directors, H. Reichenbach, J. F. Schmidt, Wm. Meyer and Henry Follhardt.

DECATUR, IND.—The Citizens' Telephone Company has elected the following officers: President, John S. Bowers; vice-president, D. D. Clark; treasurer, E. X. Ehinger, and secretary, F. M. Schirmeyer.

UNION CITY, IND.—The following officers and directors have been elected by the Union City Telephone Company: C. Kipp, president; James D. Money, vice-president; W. D. Rush, secretary and treasurer; board of directors, C. Kipp, W. D. Rush, James Money, J. E. Teaford and Ralph Flory.

DUBUQUE, IA.—At the annual meeting of the stockholders of the Interstate Telephone Company, all the officers and directors were re-elected with the exception of Director J. J. Kahn, of Elkader, who was succeeded by George Kreibs, of Elkport. The officers and directors are as follows: President, J. M. Dunn, Earlville, Ia.; vice-president, R. W. Gadsen, Dyersville, Ia.; treasurer, C. M. Laxson, Earlville, Ia.; secretary, J. H. Denkhoff, Dyersville, Ia.; directors, George Kreibs, Elkport; V. H. Stevens, Dubuque, and J. L. Paine, Fayette, Ia.

NORTON, KAN.—The Farmers' Telephone Company at the annual meeting re-elected E. V. Peterson, president; Sam Teaford, vice-president; John Gleason, treasurer; F. M. Duvall, secretary, and F. C. Foley, trustee.

SAVANNAH, MO.—The election of the Andrew County Mutual Telephone Company resulted in the choosing of E. Carpenter, Newton Coffman, John Burns, J. H. Huffman and C. R. Bowman as members of the board of directors. The board organized by electing E. Carpenter, president, and C. R. Bowman, secretary and treasurer. Mr. Bowman will be the business manager for the ensuing year.

LIBERTY, NEB.—At the annual meeting of the stockholders of the Liberty Telephone Company, G. W. Withers and C. S. Chandler were elected directors to succeed S. A. Kinney and G. W. Withers, whose terms had expired. At a subsequent board meeting, the following were elected officers for the ensuing year: W. G. Huntington, president; Tom Shannon, vice-president; Geo. Sutter, secretary, and C. S. Chandler, treasurer.

MISCELLANEOUS.

ALBANY, N. Y.—The annual election of the stockholders of the United Message Company was held on September 21 in this city. The directors chosen were as follows: Jas. M. Andrews, Schenectady, N. Y.; T. M. Brush, Elyria, Ohio; I. H. Griswold, Elyria, Ohio; Wm. C. Geer, Troy, N. Y.; Wm. B. Harris, Albany, N. Y.; H. Hendrickson, Albany, N. Y.; H. C. Hequembourg, 30 Church St., New York City; B. G. Higley, Sandy Hill, N. Y.; F. W. Kavanaugh, Waterford, N. Y.; Peter McCarthy, Troy, N. Y.; Geo. D. Smith, Little Falls, N. Y.; F. H. Sudro, Elyria, Ohio; E. B. Toedt, Albany, N. Y.; Eugene Walrath, Little Falls, N. Y.; Hon. J. M. Wever, Plattsburgh, N. Y.; E. M. Woodard, Albany, N. Y.; Jas. McNaughton, Schenectady, N. Y.; Irving R. Coughtry, Albany, N. Y.; Richard Stephens, Albany, N. Y.; Henry Dumary, Albany, N. Y.

For inspectors of election: Frank Griffin, F. E. Derr.

DUBUQUE, IA.—The Tri-State Telephone & Telegraph Company of East Dubuque has been purchased by the Pitcher Telephone Company of Warren, Ill. The union of these two strong Independent companies under the control of one set of officers makes the combination a strong factor in the telephone situation in western Illinois and with the aid of the Independent lines running to Freeport and other cities, the Pitcher company will be in an excellent position to meet any and all competition with the Bell company.

STORM LAKE, IA.—W. C. Ellis has purchased the Laurens telephone exchange.

KINCAID, KAN.—At a meeting of the directors of the Eastern Kansas Telephone Company, held Sept. 1, the resignation of R. L. Fraser, secretary and general manager, was accepted, and A. L. Martin was appointed to fill the vacancy.

Mr. Fraser was the founder and builder of this system, which is one of the best built and equipped in the state.

About eighteen months ago Mr. Frazer was stricken with locomotor ataxia, and although confined to his bed almost continuously since that time, has continued to direct the affairs of the company. He still has charge of the auditing department.

CROOKSTON, MINN.—The Tri-State Telephone Company has purchased from J. M. Bishop, the local telephone system and toll lines secured by Mr. Bishop from H. Fant last winter. The new owners took possession Sept. 1. Geo. L. Sterns is to be resident manager of the system.

HARDIN, MO.—The Hardin telephone exchange has been purchased by Mr. W. A. Merrifield.

POTSDAM, O.—The exchange of the Home Telephone Company was recently destroyed by fire.

LOGAN, OHIO.—It is reported that the telephone will be adopted for train dispatching by the Hocking Valley Railroad. The first line will be operated between Columbus and Athens, a distance of 76 miles, and over the busiest portion of the entire Hocking Valley system. This new innovation will be installed soon after M. S. Connors, the general manager of the system, returns from his vacation.

PENDLETON, ONE.—For the sum of $9,000, T. E. McGintie, of Seattle, has purchased the Hilton telephone line, running from this place to the south end of the county, and it is announced that the line will be both extended and improved in the near future. The Hilton system has a total of 130 miles of telephone line and there are something over 80 subscribers on the line and its branches.

MILWAUKEE, WIS.—Telephones may supplant the telegraph system on the Morgan lines as a result of an investigation by A. H. Westfall, general superintendent of the Southern Railway, of the telephone despatching system of the Milwaukee road. After seeing the telephone tested under all conditions of despatching and going into the minute details with U. J. Fry, superintendent of telegraph, and B. H. McNancy, superintendent of terminals, Mr. Westfall decided to install the system on a division between Greensboro and Danville North Carolina.

SIMCOE, ONT., CAN.—At a meeting of the ratepayers called by Mayor Carter to consider the telephone system, it was decided to organize an Independent telephone company.

THE DAILY CONSULAR AND TRADE REPORTS of September 21, issued by the Bureau of Manufactures, U. S. Department of Commerce and Labor, contains the following item:

"Consul-General Ernest L. Harris, of Smyrna, Turkey, reports that all the restrictions on the importation of electrical apparatus into the Turkish Empire have been removed. The city of Smyrna, with a population of 400,000, will now have a telephone system. It is quite certain that a concession will be granted within the next few months. Every city in Turkey of any importance will now have a telephone system and Consul-General Harris advises that American firms interested in such enterprises should send out their agents at once."

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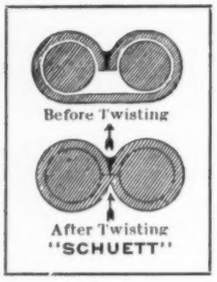

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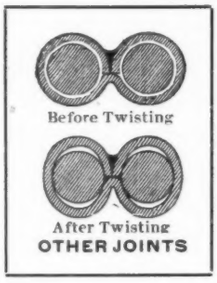

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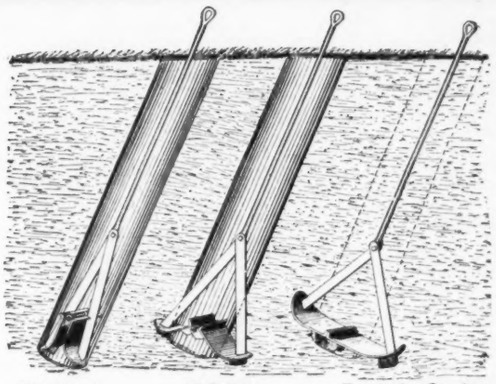
The Indiana Anchor

The Anchor that CAN'T Creep

EASILY PLANTED CAN'T PULL OUT
SEE THE SHAPE═══THAT'S WHY

MADE IN THREE SIZES
13x6 19x8 25x12



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TOOLS— Augur and Tamping Bar.

TIME— Installed in one minute after hole is bored.

SLACK— None; perfectly rigid the moment installed.

MATERIAL— Malleable and Wrought Iron; Can't break.

COST— Cheapest anchor made considering holding surface.

See the Shape That's Why.

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Manufacturers INDIANAPOLIS, IND.

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By means of new facilities just acquired, and thus produce them better and cheaper than can be done in small lots. We can furnish them promptly in any quantity, on better paper, put up in better shape, and at LOWER PRICES THAN EVER BEFORE OFFERED.

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Write for Sample Forms and Prices.

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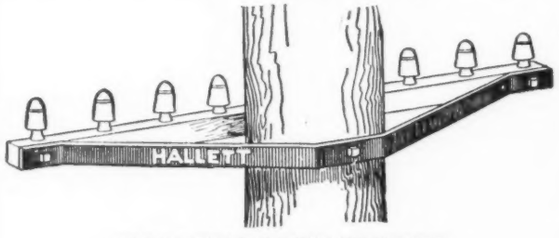
DEFIANCE, OHIO

CROSS ARM BACK BRACES

hold the cross arm rigid, which makes Telephone construction work more permanent. We make the braces of flat material or angle iron



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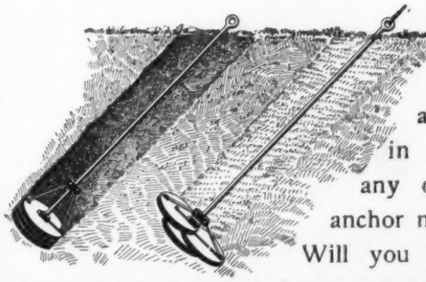
10,000 Telephone Conversations in a DRY CELL

if they don't leak out on shelf wear. Shelf-wear is all-important to the telephone manager, and in solving this problem he has the co-operation of the

French Battery & Carbon Co.
(Makers of the "Fleur de Lis" Dry Cell)
MADISON, WIS.

The "EVERSTICK"



guy anchor is higher in efficiency and lower in price than any other guy anchor made. Will you have proof?

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Transmitter
Mouth Pieces
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Telephone
Appliances

OUR QUALIFICATIONS--Largest plant in the world, finest equipment procurable, thirty years' experience.

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In Every Conceivable Form

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We are Wholesale Manufacturers of

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Leather Nail Heads	Jack Straps	Eastern and Western Climbing
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"DREADNAUGHT" CONDENSER

SELF-SEALING

The Standard for Telephone Purposes

Absolutely proof against short circuiting and therefore unimpaired by lightning or other high tension currents.

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Patented by G. F. Mansbridge, St. Margarets, Sanderstead, London, England, but Manufactured in the U. S. A.

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Applications for license to manufacture in the United States should be addressed to the patentee.

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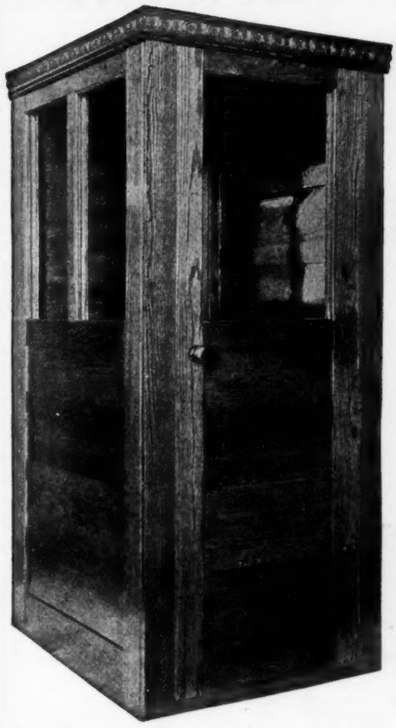

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The back is made at right angles with seat.	The back has regular angle with seat.	Adjustable back; any any angle.

Can be had in Cane or Wood Seat; also the proper height for any Switchboard.

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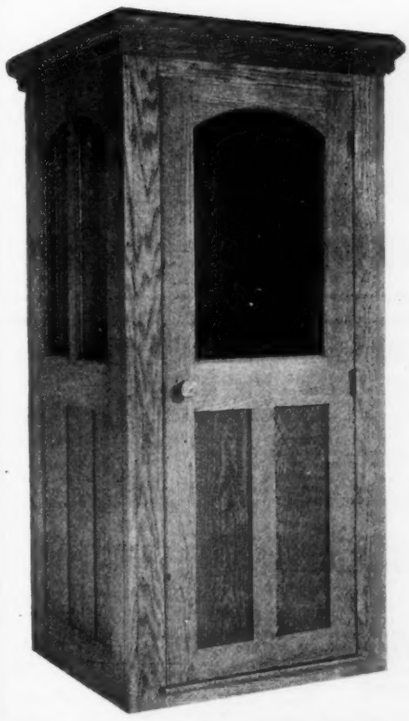

are Necessary in Long Distance and Improve Local Service.

Write for Catalogue.

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Recognized as Standard by all Telephone Companies

Compressed Cleats Hold the Slack. No Breakage

FOR USE ON PLASTERING

EXACT SIZE PAT. JULY 1906

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Insulated Staples, the only Mechanically Correct Method of securing wires with a driven fastener.

Tube Flux for Soldering. Insures a good quick job.

Full size of Tube 1 x 5 inches

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1 Gallon **Faultless** 1 Gallon

Insulating Compound

"TRUE TO NAME"

For
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VOLTMETERS, AMMETERS, MILLIVOLTMETERS, VOLTAMMETERS, MILAMMETERS, OHMMETERS, PORTABLE GALVANOMETERS, GROUND DETECTORS AND CIRCUIT TESTERS

Our Portable Instruments are recognized as THE STANDARD the world over. Our STATION VOLTMETERS and AMMETERS are unsurpassed in point of extreme accuracy and lowest consumption of energy.

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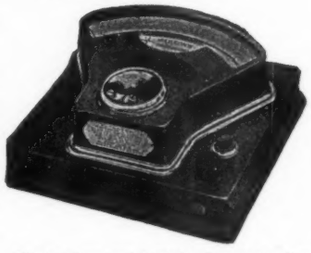
Berlin—European Weston Electrical Inst. Co., Ritterstrasse No. 88.
New York Office—74 Cortlandt Street.



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A New Soldering Flux for All Metals

Ruby Fluid possesses marvelous qualities and is probably the greatest of modern inventions relating to the metal trades.

Electricians using solder are interested because Ruby Fluid is the only complete substitute for sal-ammoniac, acid pastes, salts, and other corrosive mixtures now on the market.

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Ruby Fluid is the only clean, quick acting flux for ALL metals shipped in tin cans, or used from a Metallic Fountain Brush.

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Protects your batteries, prevents broken connections and provides a neat receptacle for unsightly exposed batteries in desk or hotel type magneto telephones.

F. W. PARDEE, Mfr.

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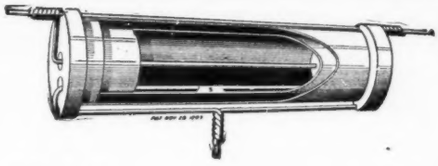
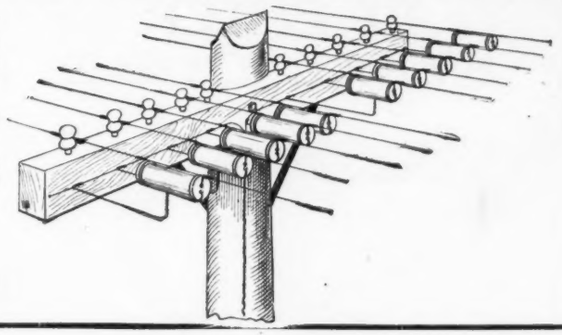


THE BERRY LIGHTNING ARRESTER

Will save your instruments and cable pairs from destruction by lightning. It is **The Original Line Protection**



and has been on the market for the past four years. It is **Not Necessary to Cut the Lines** to install this arrester. No fuses, no carbons, no springs.

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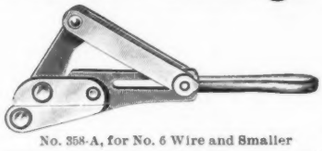
Klein's New "Chicago Grip"



No. 358-A, for No. 6 Wire and Smaller

is made of steel forging, polished and nickel plated. It is a well-proportioned and reliable tool. The draw link is arranged so it does not fall in the way of the wire. It holds fast on iron or copper wire. Do not fail to have our Catalog on file. It is arranged with Code and List numbers for convenient ordering.

All prominent supply houses carry our products.

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Chapman Lightning Arrester

Manufactured by

Minnesota Electric Co.

Minneapolis, Minn.

Selling Agent, H. E. COBB,
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For next year get the best:—That's our "New Form." Most neat, complete, convenient form yet devised. At least four times as many Companies are using this form, as of any other. All are pleased and re-order, year after year. If you haven't seen it ask for circular describing it, or order copy sent on approval.

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The best form, best quality and the lowest price on the market.

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All kinds of Blanks, Forms and Books for Telephones and Toll Line Accounting.

Write for Sample Forms and Prices.

DESIGNED BY PRACTICAL MEN

The Sky Rocket Arrester

Made for practical work, and they do it right. Their mission is to protect your lines from charges of excessive potential whether due to lightning or other causes, and they fulfill this mission invariably and infallibly.

Details, prices and references await your inquiry.

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PREMIER STEEL CORD

ALWAYS IN ALIGNMENT

In the hollow of the cord at the plug end, there's a reinforcing spring made of the highest grade spring steel. Not only does this prevent the conductors from being thrown out of alignment, but it also makes it practically impossible to break the cord at the plug end, and that's where the strain is greatest. Operators don't have to be careful when you use Premier Steel Cord—it'll last in spite of shamefully careless usage. Better get details.

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WE make a handsome, frosted glass globe or canteen sign, especially adapted for use in public places, such as hotel lobbies, drug stores, cigar stands, etc. It can be attached to any 16-candle power electric light. The independent shield in colors is placed on one or both sides as desired and the canteen is made in three diameters, eight, ten and sixteen inches, with or without flasher and with or without "goose-neck," as may be desired. Use this sign in front of your pay stations and watch your toll business grow. Sign not affected by weather conditions; will last indefinitely.

These Signs Draw Enough Business to Soon Pay for Themselves. They Draw it by Night When You are Best Prepared to Handle it.

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IS OUR FIRST AIM IN ANALYTICAL WORK

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Chemical Experimental Work, Specifications, Estimates, Etc.

Excellent Laboratories to meet all Requirements

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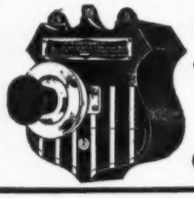

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THEN INSTALL **GRAY PAY STATIONS** AND YOU'LL GET IT

All details are in Catalog No. 50. Write for a copy.

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H.-C. Seamless Tubular Wire Connectors

make a perfect self-welding joint. They are seamless and are drawn up from sheet copper and may be tinned for use with iron wire. Atmospheric conditions cannot impair their efficiency. Write for price lists.

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Samples FORTY CENTS, Prepaid

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Telephone Transmitter Arms and Bases

Transmitter Arms of pressed steel are superior for their lightness, strength, beauty, and permanency of finish.

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Specify Them in Your Purchases

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Capital High Speed Steel	Oil Tempered Wire
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Crucible Cold Rolled Steel	Cold Drawn Screw Rods
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Cold Rolled Drawing and Stamping Steel

Evidence of our ability to meet all trade demands:

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We have the "goods" and the facilities for supplying you promptly at right prices.

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Cedar Poles

LARGE BUTTS

We cut poles from lands owned by our Company in Northern Michigan on Lake Superior Shore, where the cedar is very **sound** and **stocky** with **heavy butts.**

All sizes in stock all the year round.

Write for a Copy of Our Telegraph Code for Cedar Products Giving Valuable Information About Poles.

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1708-1710-1712 Tribune Bldg.

CHICAGO, ILL., U. S. A.

White Cedar

POLES
POLES

LARGE STOCK—14 to 65 ft.

Prompt Shipment

FRANCIS BEIDLER & CO.

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YARDS:
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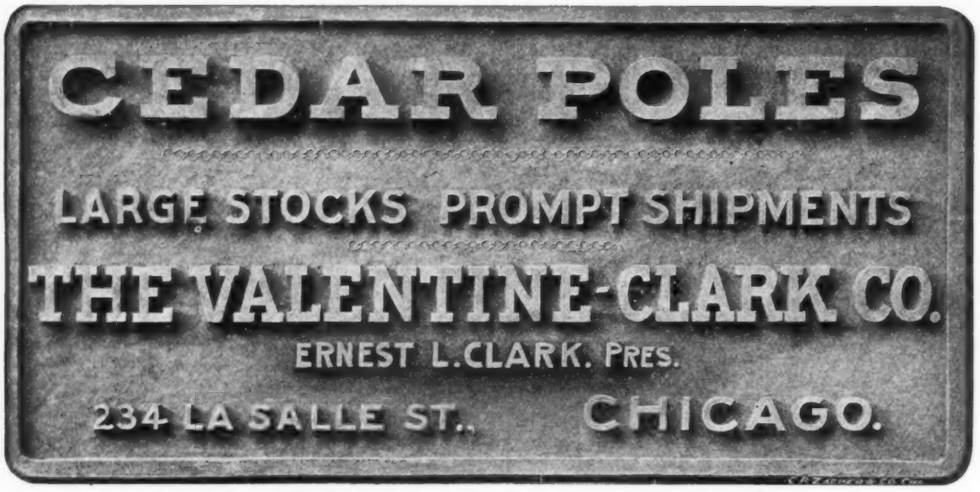

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MINNEAPOLIS, MINN.

PRODUCERS OF EVERYTHING IN

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CEDAR POLES

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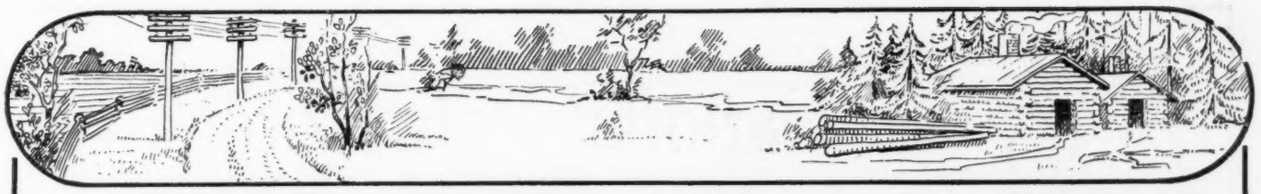

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Thoroughly seasoned. Any length or size. We own large tracts of land in the Lake Superior District. Our yards are located at advantageous points, so that we are in a position to guarantee prompt shipments.

WE HAVE A FINE STOCK OF TELEPHONE POLES
16 feet to 30 feet
FOR SALE AT LOW PRICES
PRODUCERS OF WHITE CEDAR SHINGLES, POSTS AND TIES

WM MUELLER COMPANY
-MAIN OFFICE-
ESTABLISHED 1862 BLANEY, MICHIGAN

White Cedar Poles

Being producers we can save you jobbers profits.

Yards in Minnesota, Wisconsin, Ontario and Manitoba. Quick shipments anywhere in United States or Canada.

T. M. Partridge Lumber Co.
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Write today for my prices on
FINEST GRADE
WHITE CEDAR POLES
Must move Quickly Mixed Lot 20's to 40's
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Yards: Deer River and Ball Club, Minn.

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You Can't Beat Our Poles and Prices

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Marbury & Speer Lumber Company
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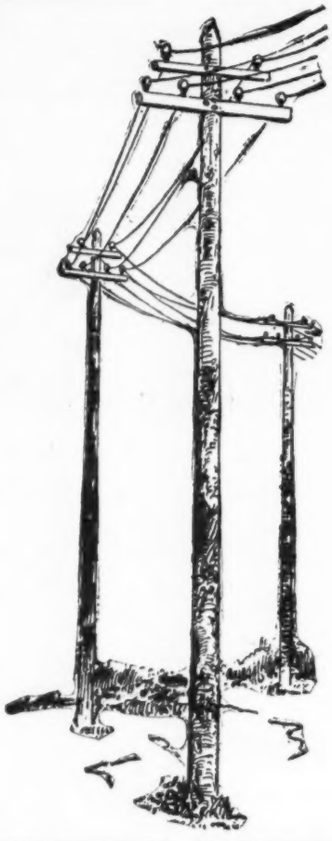


National Pole Company

Escanaba, Michigan

Successor to the Cedar Department of the

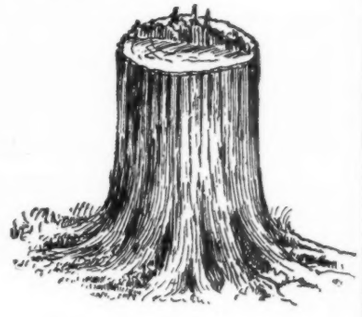
PITTSBURG & LAKE SUPERIOR IRON CO.

Producers and Shippers of

CEDAR POLES

From the Stump to the Line

We carry large stocks of Poles at various points in the States of Michigan, Wisconsin, Minnesota, Idaho, Washington and Maine, and are in position to make immediate shipments at lowest prices and freight rates.



No. 1

CEDAR POLES

Both Northern White and Idaho Red Cedar

You will certainly lose nothing by buying now

Page & Hill Co.

Minneapolis, Minn.

There's a DIFFERENCE

between the firm who will sell for sufficient inducement and the firm who **Wants** to Sell.

We Want to Sell

TELEPHONE POLES

Especially—7″ x 30′ and 5″ and 6″ x 25′

WRITE US

Stone-Cook Lumber Co.

Northome, Minn.

WHITE CEDAR POLES

A Large Stock of

STRICTLY HIGH GRADE POLES

Send Us Your Inquiries

Wittenberg Cedar Co.

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CEDAR TELEPHONE & TELEGRAPH POLES

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OFFICE

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We produce our own stock! Know the requirements of the trade! Have six large yards and several smaller ones! Can make prompt shipments of any lengths from 16 to 60 feet

These Facts Ought to be Worth Your Attention When Buying Poles!

LONG·LEAF YELLOW·PINE CROSS·ARMS

SOUTHERN WHITE CEDAR POLES

POLES

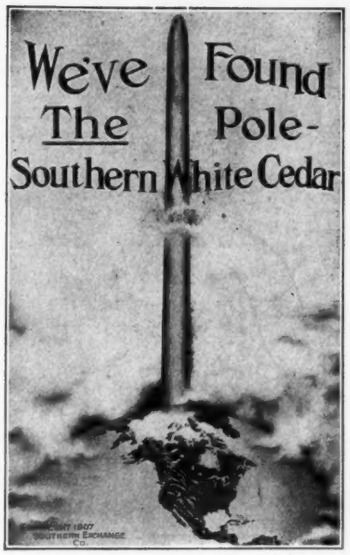
Southern White Cedar
Chestnut

Large Stock All Sizes
Prompt Shipment

Long Leaf Yellow Pine
(Painted)

Sawed Octagonal or Square
MADE TO ORDER
ANY LENGTH

Top and Butt Measure as per Specifications, Specialy Adapted for City Lines



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Long Leaf Yellow Pine

Standard Sizes
OR
Special Sizes

Large Stock
Quick Shipments

Carload or Less than Carload Lots

LONG LEAF YELLOW PINE OCTAGONAL POLES

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CEDAR POLES

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COMPLETE STOCK ALL SIZES
BEST QUALITY

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Cedar Poles and Piling
In any Length

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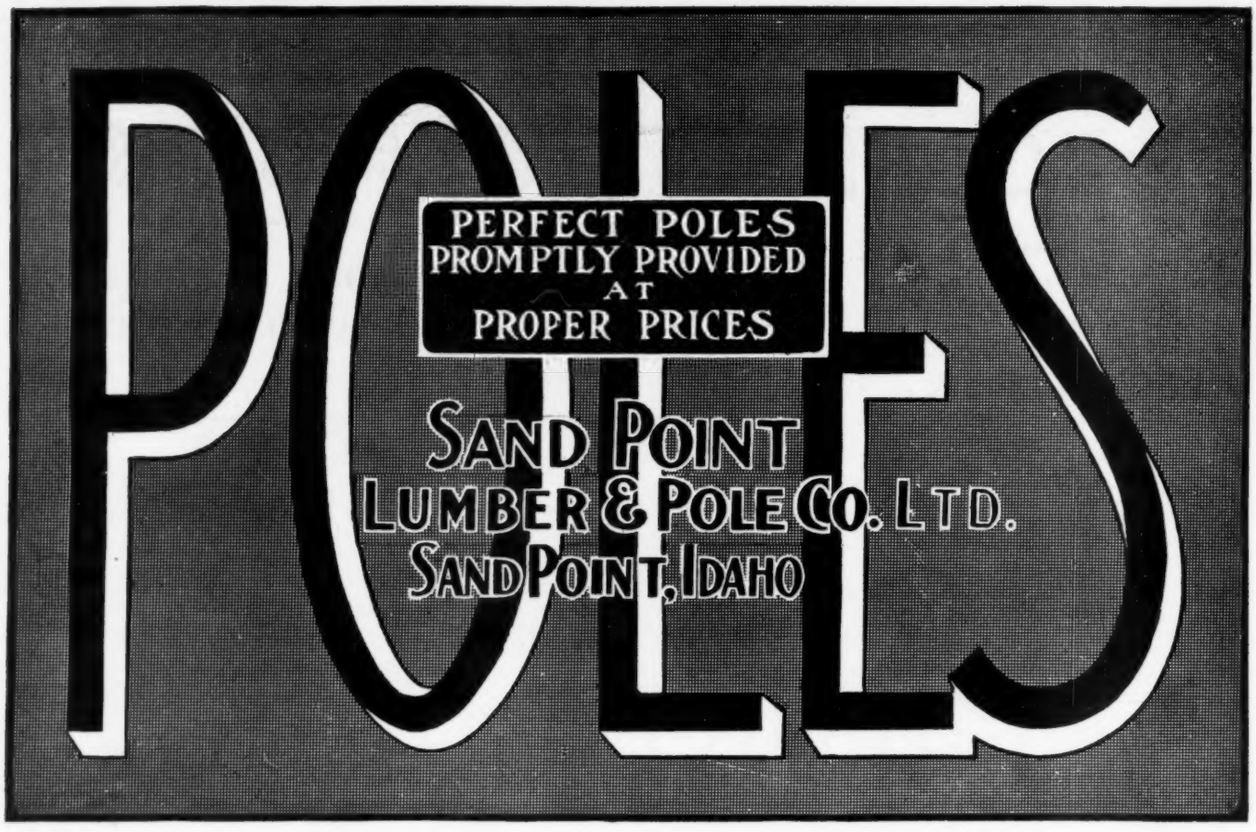

White Cedar Poles

2900	Pieces	4"	16'	2500	Pieces	5"	25'	240	Pieces	7"	40'
300	"	5"	16'	2200	"	6"	25'	20	"	8"	40'
200	"	6"	16'	200	"	7"	25'	7	"	6"	45'
1800	"	4"	18'	150	"	5"	30'	64	"	7"	45'
150	"	5"	18'	1900	"	6"	30'	8	"	8"	45'
100	"	6"	18'	800	"	7"	30'	4	"	6"	50'
800	"	4"	20'	50	"	8"	30'	14	"	7"	50'
1900	"	5"	20'	450	"	6"	35'	5	"	8"	50'
450	"	6"	20'	530	"	7"	35'	1	"	7"	55'
150	"	7"	20'	45	"	8"	35'	1	"	7"	65'
3000	"	4"	25'	70	"	6"	40'				

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HOLT LUMBER CO., Oconto, Wis.

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Try spending two cents
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ALL LENGTHS CAN SHIP TO-DAY

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100,000 WHITE CEDAR POLES

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Posts and Ties 349-351 Security Bldg.
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There'll never be a better chance than now.

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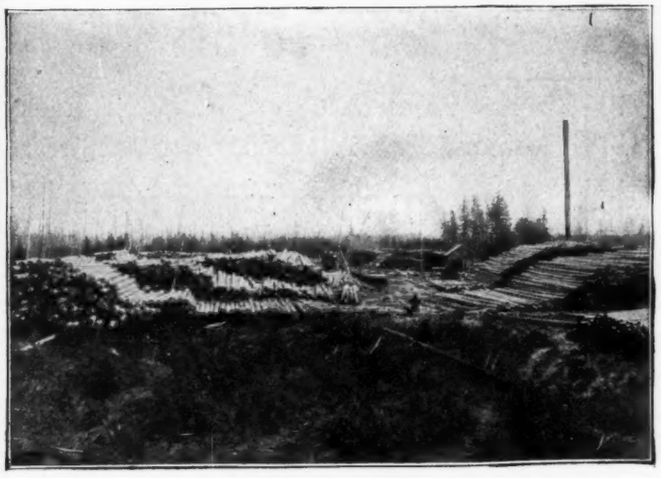

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Long Poles a Specialty

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WHITE CEDAR POLES
Producers and Wholesalers Prompt Shipments
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Buy from the Producers
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Yards: Menominee, Mich.; Nathan, Mich.; Stager, Mich.; Swanson, Mich.

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Give best service. Our prices are lowest.
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Large Stock. Best Quality
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Get my prices before buying . GEO. HARDING, Deer River, Minn.

POLES From stump to consumer. A full assortment of sizes.
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We own both timber and mills.
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Buy direct of the Manufacturer and save from

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"We keep constantly on hand a first class stock of all sizes of Chestnut, Juniper and Red Cedar poles at our yards located in Tennessee, Mississippi, Arkansas, Missouri and Texas. Can meet any competition on prices and would be pleased to have inquiries for delivered prices, best service guaranteed."

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Why not buy Pins, Brackets and Cross Arms direct from the manufacturer, saving the dealer's profit, freight charges, and make sure of quick deliveries. We can save you money on all kinds of Telephone Construction Material.

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Last 25% longer than any cedar and are much cheaper

Full Burnettized Creosoted Butt Poles
(LOGAN PATENT)

For strength, neatness and durability they far surpass all other poles on the market

Beware of imitations

MADE EXCLUSIVELY BY
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COMPUTES ELAPSED TIME to the quarter minute.
Prints the DATE. Prints Operator's Number.
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SPLENDID STOCK. PROMPT SHIPMENTS
We make a specialty of all heart stock and of special sizes. Would like to have your inquiries.
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Conduits for Underground Wires and Cables, Cross Arms, Poles, Guy Blocks and Lumber
Wood treated by our dead oil of coal tar process will never decay.
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"Many business men say how much they admire my **smooth edge Book Form Cards,**" writes one of our customers.

Think of the effect such a business card has on the opinion of your prospective customer.

Peerless Patent Book Form Cards have set a new standard of business card perfection.

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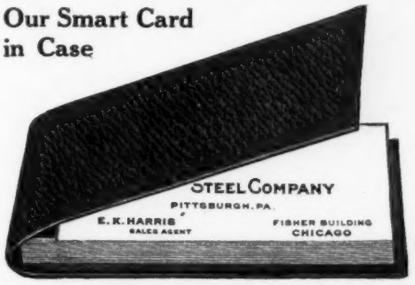

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ALWAYS READY
EASY OF ADJUSTMENT

No time lost in attaching to wire. For further information write to **GEO. H. GLASS & CO., Pekin, Ill.** or your supply house.

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Manufacturers of

POLE LINE HARDWARE

Plain and Hot Galvanized PITTSBURG, PA.

BLACKBURN GROUND CLAMPS

Give Satisfaction

ONE COMPANY HAS USED 20,000

It fits all sizes of lead or iron pipe. It is made of copper and will not break. It is the best and cheapest clamp made. A sample for the asking.

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M. & B. Ground Clamp

"THE CLAMP THAT CLAMPS"

For connecting telephone ground wires to lead or iron pipes. The tighter you set the screw the tighter it clamps. SIMPLE IN CONSTRUCTION, EASY TO ADJUST, FITS ANY SIZE PIPE. No lock nut connection to become loose. Wire soldered to strap. Remains tight whether pipe expands or contracts. No loose connections when our clamp is used.

Cheapest and Best Clamp on the Market

Write us for samples and prices

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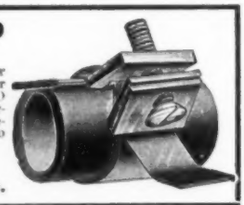

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Will finance good Independent toll line propositions. If you know of a good opening for an Independent plant, large or small, send full particulars. Address No. 518, care TELEPHONY.

$750 cash buys half interest with management in telephone system; fifty telephones in operation; plenty more orders. Write E. M. Frisby, Ramona, Okla.

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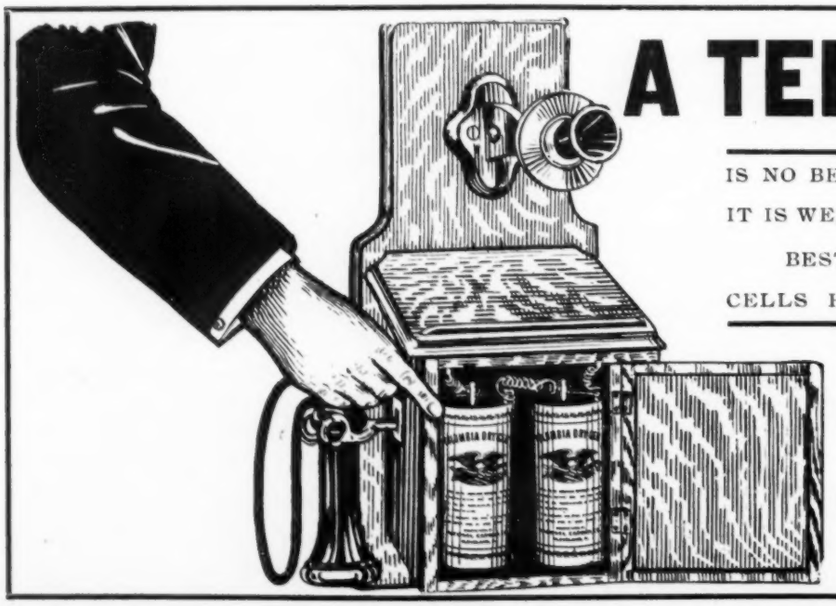

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IS NO BETTER THAN ITS BATTERIES

IT IS WELL THEREFORE TO USE THE

BEST **COLUMBIA** DRY

CELLS HAVE THIS DISTINCTION

NO EXTRA CHARGE FOR

FAHNESTOCK CONNECTIONS

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Don't be Satisfied with Medium Grade Guy Clamps

A. T. & T.
ROLLED STEEL
CLAMP

HIGH TENSILE
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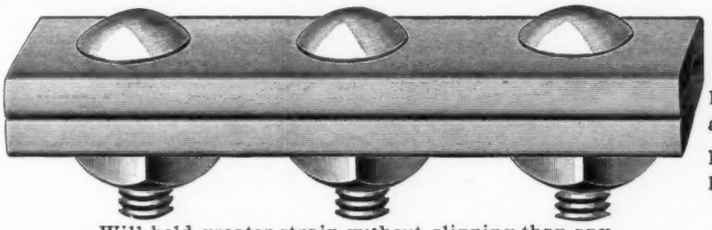

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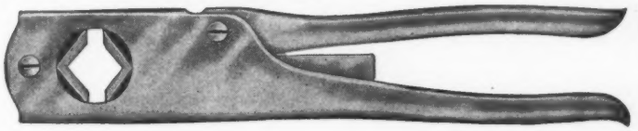
THIS tool is so designed that pressure is applied to the tube equally at four points, thereby causing the tube to snap off at any point where pressure is applied. By using this tool there will be no wasting of tubes. It needs no sharpening and is made in a convenient size to carry, weighing only fourteen ounces. Made adjustable to $\frac{1}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ inch tubes or any size of arc-light carbons. No wireman's kit is complete without it.



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